

Comparative Country Studies
Volume 1, Number 2 2015

Case-based payment systems for hospital funding in Asia: an investigation of current status and future directions

Peter Leslie Annear and Dale Huntington, Editors



Asia Pacific Observatory
on Health Systems and Policies



OECD

Comparative Country Studies
Volume 1, Number 2 2015

Case-based payment systems for hospital funding in Asia: an investigation of current status and future directions

Peter Leslie Annear and Dale Huntington, Editors



Asia Pacific Observatory
on Health Systems and Policies



WHO Library Cataloguing-in-Publication Data

Case-based payment systems for hospital funding in Asia: an investigation of current status and future directions

(Comparative Country Studies, Vol. 1 No. 2 2015)

I. Economics, Hospitals. 2. Hospital costs. I. Asia Pacific Observatory on Health Systems and Policies. II. Organization for Economic Cooperation and Development. III. World Health Organization Regional Office for the Western Pacific.

ISBN 978 92 9061 732 7 (NLM Classification: WX157 JA1)

© World Health Organization 2015

All rights reserved. Publications of the World Health Organization are available on the WHO website (www.who.int) or can be purchased from WHO Press, World Health Organization, 20 Avenue Appia, 1211 Geneva 27, Switzerland (tel. +41 22 791 3264; fax: +41 22 791 4857; email: bookorders@who.int).

Requests for permission to reproduce or translate WHO publications—whether for sale or for non-commercial distribution—should be addressed to WHO Press through the WHO web site (www.who.int/about/licensing/copyright_form/en/index.html). For WHO Western Pacific Regional Publications, request for permission to reproduce should be addressed to Publications Office, World Health Organization, Regional Office for the Western Pacific, P.O. Box 2932, 1000, Manila, Philippines (fax: +632 521 1036; email: publications@wpro.who.int).

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature that are not mentioned. Errors and omissions excepted, the names of proprietary products are distinguished by initial capital letters.

All reasonable precautions have been taken by the World Health Organization to verify the information contained in this publication. However, the published material is being distributed without warranty of any kind, either expressed or implied. The responsibility for the interpretation and use of the material lies with the reader. In no event shall the World Health Organization be liable for damages arising from its use.

The named authors alone are responsible for the views expressed in this publication.

Contents

Introduction	2
<i>Peter Leslie Annear, Dale Huntington</i>	
Chapter 1. Contextual issues for DRG-based hospital payment.....	10
<i>Peter Leslie Annear, Ke Xu</i>	
Chapter 2: Issues in the design and implementation of case-based payment.....	26
<i>Stephen Duckett</i>	
Chapter 3: Implementation experience with DRG-based payments.....	54
<i>Soonman Kwon and Changwoo Shon</i>	
Chapter 4. Assessing the impact of case-based payment.....	82
<i>Yuki Murakami and Luca Lorenzoni</i>	
Chapter 5: Conclusions and lessons for the region.....	106
<i>John C. Langenbrunner</i>	
Appendix 1. Glossary of main terms	125
Author Biographies	128

Introduction

Peter Leslie Annear, Dale Huntington



A number of middle-income countries in the Asia and Pacific region are introducing or considering the implementation of Diagnosis-Related Groups (DRGs) as a method for managing hospital funding arrangements. DRGs come within a broader category of case-based or activity-based funding (ABF) arrangements that are used principally as a method for increasing the efficiency of hospital services. DRG-based hospital payment systems adopt a standard pricing framework that provides equality in payments across health-care providers for services of the same kind. Generally, DRGs are introduced to address the shortcomings of pre-existing fee-for-service (FFS) methods of hospital payment, which encourage an oversupply of services to increase revenue, and (in a few cases) fixed capitation payment systems, which have the perverse effect of reducing supply in order to reduce costs below the capitation level. DRGs, therefore, provide a technical means for the management and financing of public and/or private hospital services, and are often linked with social health insurance and government funding mechanisms.

DRG-based hospital payment systems

First developed in the United States of America (USA), DRGs have increasingly been used for hospital funding in higher-income countries. The precise use of DRGs, however, varies between countries, and different forms of ABF or case-based funding have been developed (see Appendix 1 for a list of definitions). While the terminology varies, the basic concepts remain consistent. In this volume, we therefore refer to case-based payment or DRG-based payment systems as the term for such hospital funding arrangements.

DRG-based payment systems generally aim to increase efficiency in the provision of hospital services. In the Asia and Pacific region, however, DRG- and case-based payment methods are used as a means to achieve better planning and resource allocation in order to meet population demands for improved access to hospital care; to provide incentives for more efficient service delivery; and to improve health service outcomes.

Pre-existing forms of hospital funding are most commonly based on FFS methods or, in the case of government hospitals, line-item budgeting. FFS methods are often open-ended, provide an incentive for over-servicing, and make cost control more challenging. Line-item budgeting is often

arbitrary, based on past practice, and unrelated to the actual cost of services – budgets that are below the actual cost of provision cause an undersupply of services, and budgets that exceed costs are financially wasteful. Payment systems based on DRGs are a financial and administrative tool designed to address these challenges. One example is the implementation of DRG-based hospital payments in Thailand, which aimed to address low admission rates in the Social Security Scheme and strengthen public expenditure for hospital inpatient services.

DRGs are therefore a mechanism for allocating funds to hospitals for services provided, calculated on the basis of a uniform level of reimbursement for the costs of care, and according to a system of classification of hospital cases. The DRG approach provides both a financing mechanism and a tool to measure hospital activity, thus it involves elements of both funding and management. It is a means to allocate the funding needed for the provision of hospital services, and may also be seen as a provider payment mechanism within the broader health-care financing system.

Asia Pacific Observatory on Health Systems and Policies

The study that provided the basis for the chapters in this book was carried out in 2014–2015 by a team of researchers working with the Asia Pacific Observatory on Health Systems and Policies (APO) and the Organization for Economic Cooperation and Development (OECD).

The study team comprised:

Peter Annear, Nossal Institute for Global Health, University of Melbourne, Australia

Stephen Duckett, The Grattan Institute, University of Melbourne, Australia

Dale Huntington, Asia Pacific Observatory on Health Systems and Policies, Manila

Soonman Kwon, Seoul National University

Jack Langenbrunner, Australian Department of Foreign Affairs and Trade, Jakarta

Luca Lorenzoni, OECD, Paris

Yuki Murakami, OECD, Paris

Supasit Pannarunothai, Naresuan University, Bangkok

Viroj Tangcharoensathien, International Health Policy Program,
Bangkok

Ke Xu, World Health Organization Regional Office for the Western
Pacific, Manila

The panel of authors and researchers drew mainly on published and grey literature, as well as expert knowledge of the issues, to survey the current status of DRG-based systems in the region. Some members of the study team first met in Seoul in November 2013, and again at the Health Systems in Asia conference in Singapore in December 2013, where the initial protocol for the study was prepared. A meeting in Bangkok in March 2014 discussed the general technical content and methodology and initial chapter outlines developed. The authors subsequently presented the first draft of each substantive chapter to a study group meeting in Seoul in August 2014. The final drafts of reviewed chapters were shared among the team via teleconferences in late 2014 and early 2015. All chapters were peer-reviewed by the following: Indrani Gupta, Naoti Ikegami and Rick Marshall. The authors are grateful for their comments and suggestions.

Technical and administrative support was provided for the study by the APO Secretariat. The OECD provided technical support and access to the OECD database and research resources.

Purpose and scope

This volume presents a background study of DRG-based payment systems, drawing on the experience of implementing such hospital funding arrangements internationally, including an overview of developments in the Asia and Pacific region. The aim of the study is to provide an evidence base and identify lessons learned for emerging countries in the region who are considering implementing a DRG-based payment system. The purpose of the study is:

- to describe the context in which DRG implementation is being considered;
- to describe the policy issues related to the introduction of DRG-based hospital payment methods;

- to describe issues confronted in the development and implementation of DRG-based payment systems;
- to assess the experience to date across the Asia and Pacific region; and
- to look at the lessons learned from the wider introduction of DRG methods internationally.

This is the first volume on DRG-based hospital payment systems to be published by the APO. It is published in the interest of national governments, policy-makers, hospital managers, the academic community, and development partners supporting the strengthening of health systems in the Asia and Pacific region. Volume 1, presented here, outlines the context, background and basic principles that underlie the introduction of DRG-based systems; the general experience in the region to date; and an assessment of effectiveness. A second volume is planned which will include a number of case studies on the preparation for and implementation of DRG-based systems in various locations across the Asia and Pacific region using a common research protocol.

This volume follows an earlier publication by the European Observatory on Health Systems and Policies edited by Reinhard Busse, Alexander Geissler, Wilm Quentin and Miriam Wiley. The 2011 study, *Diagnosis-Related Groups in Europe: moving towards transparency, efficiency and quality in hospitals*, provides the theoretical foundation for the current volume (Busse et al., 2011). This volume also builds on a study carried out through WHO by Inke Mathauer and Friedrich Wittenbecher, which considered the implementation experiences and challenges of DRG-based payment systems in low- and middle-income countries (Mathauer et al., 2012; Mathauer et al., 2013).

A companion volume in the APO Comparative Country Studies series published in 2015, *Public hospital governance in Asia and the Pacific: Volume 1, Comparative country studies*, edited by Dale Huntington and Krishna Hort, reviews case studies from across the Asia and Pacific region (Huntington et al., 2014). Both the current volume and the hospital governance study are placed within the context of the region's move towards universal coverage and increasing pressure for greater efficiency in service provision.

The authors report that reforms in hospital governance aim to improve efficiency, quality of care and responsiveness to patient needs. The governance study concludes that reforms are context-specific, while there is a discernible trend away from centralized control by health ministries and towards increased hospital autonomy, within an environment that makes much fuller use of “internal-market” mechanisms.

Structure of this volume

The chapters presented in this volume adopt a narrative, descriptive and analytical approach. Each chapter is based on a thorough review of the existing literature and official documentation to provide an up-to-date summary of the current knowledge. The results of the study are of significance as an account of new and emerging practices in hospital funding, and the efficient use of resources in a region where population demand for effective hospital care is growing rapidly. The main findings, which draw on data from countries where DRGs are well established, are contained in the following five chapters.

Chapter 1 provides an introduction to DRG-based hospital payment systems as one example of the methods known in some countries as case-based or ABF systems. The chapter discusses the origin, purpose and role of the DRG concept, based on a historical and thematic review of the literature.

Chapter 2 provides a historical review of the development and introduction of DRG-based payment mechanisms, using the Australian experience to identify lessons learned and to construct a uniform approach to mechanisms for introducing DRGs at country level.

Chapter 3 focuses on a review of the implementation experience of case-based and DRG mechanisms in the Asia and Pacific region, drawing particularly on research in Australia, Japan, New Zealand, the Republic of Korea, Singapore and Thailand to characterize the implementation experience with DRGs in the region.

Chapter 4 assesses the impact of case-based systems in countries in the Asia and Pacific region to make a theoretical explanation of intended and

unintended consequences due to the introduction of DRG-based hospital payments. The chapter draws on evidence from various countries in the region, and uses data from the OECD and other sources to investigate the evidence regarding cost, budget, quality, productivity and hospital-level efficiency in OECD and selected middle-income countries.

Chapter 5 summarizes the experience in the Asia and Pacific region, identifies lessons learned, and provides recommendations for the further introduction and development of case-based payment mechanisms in the region.

Chapter 1. Contextual issues for DRG-based hospital payment

Peter Leslie Annear and Ke Xu



Key points

- Many countries in the Asia-Pacific region have introduced, piloted or are now considering the introduction of case-based payment mechanisms, including Diagnosis-Related Groups (DRG) with a view to increasing efficiency in hospital funding.
- Case-based payment systems have been introduced also with a view to achieving better planning and resource allocation in order to meet population demands for improved access to hospital care.
- These reforms are occurring within a broader context of demographic and epidemiological change, health system reform and the need to address high levels of out-of-pocket spending for health care.
- The DRG approach fits within the purchasing function of the health financing system and is often aligned with the use of social and private insurance funds as a provider payment mechanism.
- Whether a country chooses to adopt the DRG approach will depend on the key challenges it faces and its capacity to deal with the complexities of this approach.

Context and background

Within a broader context of health financing reform, social health protection and the movement towards universal health coverage (UHC) across the Asia and Pacific region, questions related to the most efficient and effective means of funding hospital care have emerged. Consequently, increasing attention is now being given to the use of DRGs as the basis for hospital funding arrangements.

DRGs provide a basis for categorizing services provided to hospital patients according to common categories based on patient diagnosis, the treatment provided, and the intensity of treatment that the patient requires. Each group constitutes a category for a specified uniform level of funding, regardless of the specific circumstances of the case of patient

treatment. DRGs therefore provide the foundation for allocating funds for hospital activities. In practice, a DRG-based hospital payment system may be characterized by only a few common groups based on the DRG classification; otherwise the number of groups may reach above 1000, depending on the complexity of the service and the budgetary needs.

DRG-based hospital payment systems and other case-based or activity-based funding arrangements (for a list of definitions, see Appendix 1) have been established in developed economies such as Australia, Japan, New Zealand and the Republic of Korea; have been implemented in different ways in China, Indonesia, Malaysia, Mongolia, the Philippines, Singapore and Thailand; and are under consideration in Fiji, Viet Nam and elsewhere.

In the middle-income countries in the Asia and Pacific region, interest in DRG-based or activity-based hospital payment systems comes at a time when these countries are also committed to implementing policies that advance progress towards the achievement of UHC. Furthermore, these countries are passing through a period of demographic and health transition in which populations are ageing, the burden of disease is increasing, the prevalence of chronic and noncommunicable diseases is rising significantly, and weakness in health resource allocation is evident.

In these circumstances, it is imperative to implement methods that strengthen hospital funding in terms of both allocative efficiency (providing hospitals with the funding needed to meet demand for appropriate levels of service) and technical efficiency (delivering services at the lowest cost, given a required level of quality). This is true in the high-income countries and also in the middle-income economies. Generally, the countries that have already implemented DRG-based hospital payment systems, such as Australia, Japan, New Zealand and the Republic of Korea, already have health systems that provide close to universal coverage (in some form). In some respects, this is coincidental: systems with the characteristics of universal coverage have commonly implemented some form of a purchaser-provider split in service provision, and consequently require an efficient method for allocating hospital funding. DRGs can provide an effective tool for this task.

For locations within the Asia and Pacific region, a move towards the implementation of DRG-based hospital payment systems therefore confronts questions of national scale in the management and administration of health financing, issues related to public hospital governance, and questions related to the characteristics of the hospital sector (including the relative strengths and weaknesses apparent in the provision of outpatient and inpatient services). These issues are the subject of further discussion in the following chapters.

Health financing and hospital provider payment

Reforms to hospital funding procedures take place within a broader context of health financing. In the Asian region in particular, concern about the funding of health-care delivery is made more acute by the very high proportion of health-care financing provided through out-of-pocket (OOP) payments by patients. Payment for hospital care makes up a large part of these OOP payments, which commonly provide around 60% of total health expenditures in many Asia countries (Evans et al., 2013; Kwon, 2011; Tangcharoensathien et al., 2011). Whether through efficiency measures or the purchaser-provider split the implementation of DRG-based hospital payments may be seen as integral to achieving the broader aim of funding hospital care in a way that provides greater efficiency and increased social health protection for patients in need.

The DRG approach is frequently associated with social health insurance arrangements as a method of provider payment for hospital services, and may be applied to hospital care delivered through both the public and private sectors. The DRG approach is intended to achieve greater equity in financing, in the sense that every provider receives the same payment for equal services delivered. The implementation of DRG-based hospital payment methods therefore generally involves a move away from existing forms of hospital payment, including predominantly FFS payments by insurance providers or patients and/or line-item budgeting by health ministries.

The DRG approach is a provider payment method that sits within the purchasing function of the generally accepted health-financing framework (Kutzin, 2008). DRG-based hospital payment systems are therefore often

the product of changes and developments in the three identified health financing functions: the collection of funds, the pooling of funds, and the purchasing of health services.

Within the broader context of health financing, there is an evident move within the middle-income countries of the Asia and Pacific region to strengthen the three health-financing functions. The collection of funds is strengthened variously by: increased taxation or other methods of improving government revenues; by social health insurance that requires a contribution from employers and employees; by household contributions made to different forms of community or private health insurance; and (in some cases) by stronger support from international donors.

These funds are pooled in different ways, so as to be available for use by health ministries, social insurance agencies and/or private insurance providers. In principle, the larger the pool and the smaller the number of pools across a population, the more likely the benefits gained through spreading risk (of individual expenditures due to health care) and cross-subsidization (in which people who are healthier and wealthier provide support for people who are ill and poor). Pooling funds in this way immediately raises the need for the pooling agency to find an efficient and effective method of engaging with and purchasing services from health-care providers on behalf of their beneficiaries. While the common initial approach has been to rely on retrospective FFS payments, FFS methods are typically costly and inefficient. Consequently, there is a trend towards implementing provider payment methods (like DRG-based payments) that are more transparent, assist in cost control, and produce the most effective service delivery for the funds available.

Increasingly, hospitals in the region are functioning as autonomous units that provide services purchased by governments and patients. Additionally, the introduction of social health insurance and other third-party purchaser arrangements means that the purchasers of health care are increasingly separated from the provider, affording a means to strengthen the representation of patient interests. For the purchasing function, and provider payment, an efficient and accountable method of hospital funding is required.

With the increasing provision of hospital care through the private sector, including the purchase of private hospital services by health ministries and social health insurance agencies within a system of UHC, the payment to public and private providers could be complex. Very often public insurance or prepaid funds start by covering services provided by public providers. The treatment price covers only part of the actual cost because the facilities also receive government funding. Therefore, when private providers are included, the same payment is not sufficient to cover the actual cost for an appropriate quality of care. To find the optimal level of payment to public and private sectors is challenging. It is essential that access to, and the quality of, appropriate care be optimized. A key to achieving this is transparency and accountability for price variations.

As a provider payment method, the DRG-based approach is essentially a price-setting mechanism. The use of the DRG approach is intended both as a measure for improving technical efficiency (achieving the optimum outcome for a given level of resources, such as a global budget) and as a means for setting the correct level of provider incentives. This will be achieved when the provider fee paid for services reflects the most efficient actual cost of provision under the given circumstances.

In principle, in conditions where the volume of services provided is not well managed, the setting of the DRG price may encourage the increased use or oversupply of hospital services, leading to an overall increase in the level of resources consumed by the hospital sector. However, if applied correctly, the DRG-based payment method should lead to an increase in both technical and allocative efficiency (the use to which funds are put) by encouraging more appropriate patient care. The outcome will, in practice, depend on the details of the design and implementation of the DRG-based payment system.

The use of a DRG-based payment system cannot, in itself, be a remedy for shortcomings in health financing arrangements. Rather, it may provide a means to an end, if properly designed and administered. To achieve the desired results in allocative and technical efficiency, it is essential that DRG-based payment systems be carefully and continuously managed. In some cases, cost containment is the motive for introducing DRGs within a

wider FFS system (as in the Republic of Korea, for example). Francesc Cots and colleagues, writing in the European Observatory on Health Systems and Policies publication on *Diagnosis-Related Groups in Europe* (Busse et al., 2011), cite three levels of incentives for hospital-care providers under DRG arrangements. It must be kept in mind that these incentives may work in a positive or negative fashion with regard to provider behaviours, costs and efficiency, and so require very careful management. The three levels are:

1. to reduce costs per treated patient (by reduced length of stay [LOS], avoidance of unnecessary care, reduced intensity of care provided);
2. to increase or reduce revenues per patient (by assigning the most appropriate price given the cost of services provided); and
3. to increase the number of patients (by reducing waiting lists, improving the quality of care, improving the hospital reputation).

The origin and implementation of DRGs

The DRG system emerged in the 1980s in the USA. It has been implemented most fully in Australia, France, Germany, the Netherlands, the Republic of Korea, the United Kingdom of Great Britain and Northern Ireland and the USA. Chapter 2 provides fuller information on the origin and functions of DRG-based payment systems and the challenges faced in implementation.

In the 1980s, Robert Fetter and John Thompson at Yale University worked with the Centers for Medicare & Medicaid Services (then called the Health Care Financing Administration) on a project that led to the development of the DRG concept (Fetter et al., 1980). The DRG approach was first implemented as a three-year experiment in the state of New Jersey. DRGs were applied nationwide after 1983 as a prospective hospital payment system, partly aimed at reducing hospital payments made from Medicare revenues.

To date, more than 40 countries have adopted their own versions of the DRG system, with different rationales, institutional setups and

methodologies. Further details of the experience in implementing the DRG approach in the Asia and Pacific region are provided in Chapters 3 and 4.

In Australia, DRGs were first adopted in 1993 in the state of Victoria. Victorian hospitals had previously been funded by historic budgets, which paid hospitals for their intention to treat patients (i.e. availability), rather than the actual work performed. In Victoria, work began towards implementing a casemix funding model for inpatients from about 1986, and a DRG-based system was fully introduced in 1993. The Australian National DRG (AN-DRG) was released in 1992. This was replaced by the Australian Refined DRG (AR-DRG) in 1998, coinciding with the introduction of the 10th revision of the International Classification of Diseases (ICD-10). The AR-DRGs are used by public and private hospitals and by state and territory health authorities to provide better management, measurement and payment of high-quality and efficient health-care services.

In the Republic of Korea, a DRG pilot project was introduced in 1997, and the system was officially adopted in 2003. The current system, which was developed in the Republic of Korea, is subject to a limited number of providers and patients with a relatively small scope. Two factors have affected the implementation of DRGs in this country: medical providers and scholars have indicated support for the long-standing FFS system, and participation in the DRG system is only mandatory for seven disease categories (for all others it is voluntary). The impact of the DRG-based payment system has been to reduce medical costs and the average length of stay (ALOS) in hospital, to reduce the average number of tests in inpatient care, and to reduce the use of antibiotics in inpatient care (though some post-discharge substitution was evident). Furthermore, the OOP financial costs to patients have decreased under the DRG-payment system, as the government expanded benefit coverage by adopting “negative listing” – that is, as well as the specified services, all services are included in the payment.

Japan developed and adopted the Diagnosis Procedure Combination (DPC) system in 2003. This is a per diem payment system that is similar yet different to the per-case DRG system. Whereas the DRG system provides a payment based on the patient case regardless of LOS, the DPC system

first calculates the DPC “group” cost, which is then adjusted for LOS. Consequently, the payment on a patient-per-day cost declines as the patient stays longer in hospital. The DPC aims to standardize clinical data and improve transparency of hospital activities. A major revision of the system was carried out in 2010.

In Thailand, research on DRGs began with preparation of the draft blueprint for health-care reform in 1993. Consequently, when the window of opportunity to adopt the universal coverage policy opened in 2001, a national DRG grouper tool based on the USA Medicare DRG was ready for inpatient hospital funding under the UHC scheme. When all teaching hospitals later joined the UHC scheme, the Thailand DRG (Thai-DRG) was modified in line with the AR-DRG. Currently, the common Thai-DRG is tailored specifically for implementations in three major government health insurance schemes.

The literature

The main findings from the literature are discussed in more detail in the following chapters. Here, we provide only a brief overview of the main pieces among the relatively limited literature that is available on case-based and DRG hospital payment systems.

Busse and colleagues (2011) investigated the implementation experience of case-based or DRG-based hospital payment systems in 12 European countries: Austria, Estonia, Finland, France, Germany, Ireland, the Netherlands, Poland, Portugal, Spain, Sweden and the United Kingdom. Their purpose was to investigate whether these countries had in fact moved towards achieving the goals established for DRG implementation: increasing transparency, improving efficiency, and assuring quality of care at hospital level. They concluded that, following the introduction of DRG-based hospital payment systems, transparency of hospital services and costs had substantially improved, efficiency had increased (evidenced by increased activity and reduced LOS), and quality of care had not been adversely affected. However, they also pointed out that positive outcomes require that DRGs are an accurate measure of hospital activity, that the details of the country-specific design are adequate, and that the regulatory and health-care contexts are appropriate.

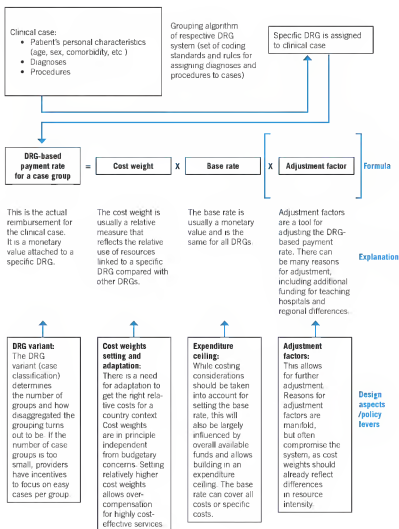
Consequently, countries planning to introduce DRG systems have two options: they can develop a new DRG system from scratch, or they can import one of the already-existing DRG systems from abroad. The former option requires a well-developed health administration and health information system; the latter is often expensive and brings with it issues related to intellectual property rights. Busse and colleagues pose three questions to countries intending to introduce DRG-based payment systems: Is the political situation favourable to the introduction of a DRG system? Is the institutional and legal context adequate? What is the intended purpose of using DRGs?

Based on a review of the literature in English, French and Spanish on DRG-based payment systems in low- and middle-income countries, Mathauer and Wittenbecher (2012; 2013) provide an overview of DRG-based hospital payment systems in these countries from the perspective of design, implementation and related challenges. They found a total of 12 middle-income countries with established DRG-based payment systems: Croatia, Estonia, Hungary, Indonesia, Kyrgyzstan, Lithuania, Mexico, Mongolia, Poland, Romania, Thailand and the former Yugoslav Republic of Macedonia. A further 17 middle-income countries were found to be engaged in the piloting or exploratory stage: Argentina, Bulgaria, Chile, China, Colombia, Costa Rica, the Islamic Republic of Iran, Latvia, Malaysia, Montenegro, the Republic of Moldova, Serbia, South Africa, Tunisia, Turkey, Uruguay and Viet Nam.

Mathauer and Wittenbecher based their analysis on a conceptual model of DRG-based payment systems that is illustrated in Figure 1. The design features they identified include the principal acting as purchaser and paying the DRG cost; the DRG variant model; the number of DRG case groups; expenditure and/or volume ceilings; and type of DRG piloting. Their findings are listed below.

- In many countries, DRG-based payments applied to both public and private sector providers.
- Hospitals needed a certain degree of autonomy in management and spending.
- Most of these countries used DRG-based payments as a retrospective payment mechanism.

Figure 1: Core design components of DRGs



Source: Mathauer and Wittenbecher, 2012

- The main aims were to contain costs, increase efficiency in inpatient care, improve transparency in hospital activities and improve service quality.
- All countries for which information was available had a budget ceiling in place.
- Most of the countries used 500–800 DRG case groups (which is consistent with OECD countries).
- The base rate value was ultimately a reflection of the overall amount of funding available.
- Most countries had adjusted cost weights in some way to their country context.
- The lack of standardized data generation and coding procedures had slowed down the introduction of DRGs.

Countries had chosen from a wide range of imported and self-developed DRG models, mostly adapted to meet the specific context. All countries had set expenditure ceilings and had faced difficulties in terms of coding standardization, data availability and information technology. One additional difficulty was the potential cost associated with obtaining the intellectual property rights for imported DRG models.

Mathauer and Wittenbecher concluded that more evidence was needed on the impact of DRG-based payment systems. They also suggested that the greater portion of health-care financing should be public rather than private; that piloting of DRG-based systems before full implementation is desirable; that expenditure ceilings are necessary; that while most countries import an existing variant of a DRG-based system, its adaption to local context is necessary; and that cooperation between providers for claims management and the generation of appropriate data is needed.

Key issues in the discussion

Within the Asia and Pacific region, countries are situated at different levels of economic and social development. Higher income countries like Japan and the Republic of Korea have their own DRG systems. Among the middle-income countries, Malaysia has introduced case-based payments more recently, while Thailand has been developing a system over the last

two decades. Lower-income countries like Viet Nam are beginning to experiment with forms of case-based payments for hospital services.

In this volume, we adopt the perspective of health-systems research and discuss the technical issues involved when a decision is made within a health system, for whatever reason, to adopt a DRG-based hospital payment mechanism. While a discussion of the broader political and economic context is beyond the scope of this volume, the discussion is nevertheless presented against the background of economic growth and social change within the Asia and Pacific region. It is, by and large, this context that has given rise to increased demand for hospital services, rising costs, and the need for more efficient hospital funding mechanisms. The case studies presented in Volume 2 will provide a more detailed investigation of the political economy in each country, and delve further into procedural questions such as: Who were the key actors in the introduction of DRGs? What were the driving forces? Who opposed the reforms and on what grounds? How was their opposition overcome? How is the system currently being sustained?

In considering the use of case-based or DRG-based payment systems in the Asia and Pacific region, a number of common characteristics should be kept in mind. Generally, hospitals provide both inpatient and outpatient services. Funds for hospital services are commonly channelled both through direct budget allocations (for government hospitals) and through social and private insurance funds. At the hospital level, the particular source from which funds are taken to cover the cost of particular services is therefore not always clear. Moreover, particularly in Asia, a significant share of total hospital revenue is provided by patients through OOP payments, paid mainly through FFS charges. In many cases, hospitals simply do not have the level of administrative or financial autonomy needed to respond to the incentives set by case-based payment methods. In most cases, case-based payment systems are initiated with a small number of cases that can be clearly diagnosed and have clearly defined treatment.

A key issue is the relationship of DRGs to government health spending and to budget funding for hospitals. In the middle-income economies in the Asia and Pacific region, total health expenditure and government health

expenditure commonly remain low as a proportion of gross domestic product (GDP). This is partly due to the expenditure elasticities related to countries with low levels of national per capita income. In some cases, such as Viet Nam, the national fiscal commitment to health care is relatively strong; in others, making the most efficient use of available national resources remains a challenge. Within a global budget for health care, DRG-based payment systems may provide the means to increase efficiency in the use of existing resources, rather than reducing funding for hospital care. For this reason, DRG or case-based payment systems in these countries may be used to manage and control the growth of hospital expenditure more effectively.

With the growth of private sector providers in Asia, it is necessary also to develop a combined approach that encompasses both the public and private sectors. DRGs may be seen as appropriate not only as a funding mechanism for public hospitals, but also as a mechanism for contracting the private sector. In most of the countries in Asia (with the exception of Thailand) private expenditure on health care is above 40% of total health expenditure and as high as 73–80% in Myanmar and Cambodia (according to Global Health Observatory data for 2013). Private expenditure is predominantly out-of-pocket spending, and can be attributed both to a growth in private sector services and to underfunding in the public sector, causing patients to purchase medicines and pay user fees.

Chapter 5 summarizes the lessons learned from the implementation of DRG-based payment systems in the Asia and Pacific region. Within the region, consideration of DRGs as the basis for hospital payments often occurs within a broader context of the need to expand benefit coverage and improve quality of care. DRGs offer a means to reform the existing payment system (often FFS) and manage health-care providers. Introduction of DRG-based hospital payments is, however, dependent on access to quality hospital data. Training and capacity building for all levels of staff on coding and implementation of the DRG system is essential, as is wide cooperation among health-care providers. Inclusion of private-sector providers requires additional planning and preparation.

The DRG method is one of a number of payment approaches that may be suitable in different circumstances. Whether a country chooses to adopt the DRG approach will depend on the key challenges it faces and its capacity to deal with the complexities and possibly adverse impacts of this approach. Once a country chooses to adopt the DRG approach as a payment method, it must prepare for implementation.

Briefly, for countries preparing to implement a DRG system, a number of preliminary steps are required:

- Development of country-wide morbidity systems (such as the International Classification of Diseases/ICD);
- Development of hospital-cost systems based on morbidity data;
- Understanding the applicability of cost-based casemix systems within a hospital or hospitals;
- Development of pilot cost-based casemix systems that could be adopted by government;
- Bringing together researchers and practitioners to create a “casemix community”;
- Educational programmes regarding the DRG classification and grouper system;
- Extensive involvement of practicing clinicians; and
- Design of price and regulatory systems that recognize adverse selection and moral hazard.

This book aims to provide lessons learned, plus an evidence base, for the emerging countries in the Asia and Pacific region who are considering the implementation of DRGs or case-based funding. The purpose is to look at the developmental aspects of case-based payment mechanisms, including DRGs, as a hospital funding method. The following chapters look at these issues in more detail.

References

- Busse R, Geissler A, Quentin W et al. (2011). *Diagnosis-Related Groups in Europe: moving towards transparency, efficiency and quality in hospitals*. McGraw-Hill International.
- Cots F, Chiarello P, Salvador X et al. (2011). DRG-based hospital payment: intended and unintended consequences. Chapter 6 in: Busse et al. *Diagnosis-Related Groups in Europe: moving towards transparency, efficiency and quality in hospitals*. 75–92.
- Evans DB, Hsu J, Boerma T (2013). Universal health coverage and universal access. *Bull World Health Organ*. 91: 546–A.
- Fetter RB, Shin Y, Freeman JL et al. (1980). Case mix definition by diagnosis-related groups. *Medical Care*. i–53.
- Huntington D, Hort K (2015). *Public hospital governance in Asia and the Pacific: Comparative country studies, Vol.1 No. 1*. Manila: World Health Organization, Asia Pacific Observatory on Health Systems and Policies.
- Kutzin J (2008). *Health financing policy: a guide for decision-makers*. Health Financing Policy Paper. Copenhagen: WHO Regional Office for Europe. 24.
- Kwon S (2011). Health care financing in Asia: key issues and challenges. *Asia-Pacific Journal of Public Health*. 23(5): 651–61.
- Mathauer I, Wittenbecher F (2012). *DRG-based payment systems in low- and middle-income countries: implementation experiences and challenges*. Geneva: World Health Organization.
- Mathauer I, Wittenbecher F (2013). Hospital payment systems based on diagnosis-related groups: experiences in low- and middle-income countries. *Bull World Health Organ*. 91(10): 746–56A.
- O'Reilly J, Busse R, Häkkinen U et al. (2012). Paying for hospital care: the experience with implementing activity-based funding in five European countries. *Health Economics, Policy and Law*. 7(01): 73–101.
- Tangcharoensathien V, Patcharanarumol W, Ir P et al. (2011). Health-financing reforms in southeast Asia: challenges in achieving universal coverage. *The Lancet*. 377(9768): 863–73.

Chapter 2: Issues in the design and implementation of case-based payment

Stephen Duckett



Key points

- There is increasing policy interest in case-based payments as an approach to funding; namely, that the major institutional providers, such as hospitals and nursing homes, and certain other health services (e.g. home care), have their funding based on their activity, with the capacity for funding to vary up or down with changes in activity.
- Case-based payments can serve a number of objectives:
 - to improve transparency of hospital funding, by moving from negotiated bases of funding to funding based on a formula;
 - to improve equity of funding between different hospitals (all hospitals funded on the same basis for the same activity); and/or
 - to drive improvement in technical efficiency.
- A country's policy and implementation capacity will shape several aspects of case-based payment design and implementation, including whether a country should develop its own casemix classification or adopt a classification developed elsewhere.
- The quality of coding of patient records will also shape the case-based payment system design; and without adequate information systems and data, a country cannot proceed to use case-based payments.
- Case-based payment implementation may be phased in terms of hospital functions, typically starting with inpatient activity, as this is the largest component of hospital expenditure and also has the best developed casemix classifications.
- Activity caps automatically cap planned expenditure and, in this way, case-based payment arrangements give the same level of spending certainty provided by global budgets and other approaches to hospital budgeting.
- As with any system of hospital funding, management of case-based payments requires control systems and feedback loops.

Introduction

Hospital spending consumes between one quarter to one third of total health expenditure (in 2011, the Republic of Korea spent 24% of its health spending on hospitals, while Japan spent 32%; in 2005, Thailand spent 35%). More than 50% of this spending typically goes towards inpatient care. Hospital costs are growing rapidly, putting pressure on government and household budgets. Further, in the context of expanding access to health care, and improving social protection against the costs of care, almost all countries in the world are reviewing how to pay for hospital care in order to achieve efficiency while maintaining quality of care.

In the past, hospital budgets were often allocated on the basis of “inputs”, for example, salaries and costs of supplies – a process known as line-by-line or line-item budgeting. This approach has no direct link to common policy objectives, such as access to care or quality. It also weakened hospital autonomy by limiting management flexibility. In response, many jurisdictions adopted “global budgets”, where hospital budgets were set by negotiation, with hospitals granted the autonomy to move spending between previously fixed line items.

The size of the global budget was determined by the outcome of negotiations, which were influenced by factors such as the prior-year or historic budget (plus or minus an annual incremental change), specific inputs and, in some cases, activity. As with its predecessor, line-item budgeting, global budgeting has no specific link to outputs or activity to be provided within the budget, which may weaken its ability to drive efficiency improvement. Also, the bases for allocated budgets are generally not transparent.

Another common approach to hospital payment is FFS. Under this arrangement, hospitals are reimbursed for the services they provide. “Services” in this context usually refers to the thousands of separate items required to treat patients, for example each drug, anaesthetic and meal. The level of detail involved in defining services varies (e.g. meals and other “hotel” services might be bundled into a single day-of-stay charge). Weaknesses in FFS payment include the administrative burden involved in itemizing and billing all services (in the USA, print-outs of FFS bills can be

metres long) and the fact there is no incentive for hospitals to manage the services used as part of treatment processes.

Increasingly, there is policy interest in an alternative approach to funding: namely, that the major institutional providers, such as hospitals and nursing homes, and certain other health services (e.g. home care), have their funding based on their activity, with the capacity for funding to vary up or down with changes in activity (Mathauer & Wittenbecher, 2013). This approach goes by a variety of names, including casemix funding (because funding is based on the “mix of cases” treated), service-based funding (because funding is based on services, not inputs or populations), prospective payment (because funding rates for the hospital are set prospectively, not based on a retrospective analysis of a hospital’s costs), and ABF (especially in those countries where the products of hospitals are referred to as activity). We use the term case-based payments. Case-based payments are also sometimes described as “the money follows the patient”, and can be used to encourage more responsiveness of facilities to patient needs.

Case-based payments can be distinguished from FFS funding in that the basis for funding is the treated patient, with the patient described in terms of the main diagnosis or procedure (adjusted for any additional diagnoses that the patient may have).

A critical element in hospital funding policy is how various types of risk, including inefficiency risks, are managed and shared between hospitals and funders. In block grant funding arrangements, such as “global funding”, the inefficiency risk is borne by the funder, as providers can reduce their volume and mix of services within the global budget. With FFS payment, the risk of wasteful additional diagnostic tests or excessive LOS is also borne by the funder. Case-based payments place an incentive on hospitals to be careful in their use of all services.

Incentives on hospitals to manage inefficiency might be mitigated by poor design of a case-based payment system if it involves generous outlier or other adjustments. Case-based payments also introduce other risks for the funder, including gaming by providers (Steinbusch et al., 2007) and unnecessary admissions, creating a volume risk.

An enhancement of case payment based on the treated hospital patient is to bundle care across sites and services – bundling pre-hospital and/or post-hospital care into a single payment. At the extreme, this can be expressed as a capitation payment, or per person payment, for a particular time period, such as one year. The greater the extent of bundling, the more likely there will be very poor explanatory power for price setting, at least initially, increasing the risk of adverse selection, gaming and inequity between providers.

This policy mix is made more complex because many countries use multiple funding streams for hospital care. There are four main sources of hospital funding: government, social health insurance, private health insurance and OOP payments by patients. The mix of these funding sources varies dramatically across countries. A critical policy issue is how these disparate funding sources are harmonized. Patient OOP payments for inpatient care may be structured as a payment for each day of stay. How do these payments link to those made by other funding sources? If case-based payments are adopted for government funding, should they also be adopted for private health insurance funding to the same hospital? If not, then the efficiency incentives of case-based payments may – unless the patient OOP payment is substantially below the per-day cost – be mitigated by the patient payment for each day of stay.

Case-based payments presuppose an ability to compare the efficiency of hospitals and to set prices based on a measure of activity. In very small countries with only a handful of hospitals, establishing the infrastructure for case-based payments may not convey commensurate benefits over and above simple arithmetic comparisons of hospital performance. As a rule of thumb, jurisdictions should probably have at least 10 hospitals, each above a minimum size, before embarking on the case-based payment journey. The minimum size criterion would vary across jurisdictions, but in theory mean that the reasonable fixed costs of keeping the hospital able to receive patients 24 hours a day are covered by activity payments.

Measuring hospital activity

The fundamental assumption of case-based payments is that it is possible to describe hospital activity in a fair and meaningful way. The technology

to do this was originally developed in the 1970s, when descriptions of hospital activity moved from counting the number of patients or days of care provided to new methods that took into account the complexity of patients treated. The breakthroughs in this area were led by Bob Fetter, a professor at Yale University. Fetter and his team (which included WHO's current Regional Director for the Western Pacific Region, Dr Shin Young-soo) developed a classification system to enable comparison of the LOS for hospital inpatients (Fetter, Shin et al., 1980). The DRG system was so named because the constituent groups were related to the diagnoses. This was the first so-called "casemix classification". Fetter's approach created a classification with fewer than 500 groups. All inpatients could be assigned to one (and only one) of these groups.

A number of casemix classifications have been developed since Fetter's original work. Some countries have developed classifications for inpatients using their country's diagnosis and procedure coding systems. Classifications have also been developed to cover other aspects of hospital care, including outpatient activity.

Fetter adopted four key principles to shape a classification system.

1. The definition of groups within a classification system is to be based on information routinely collected in computerized hospital abstracts.
2. There is to be a "manageable" number of groups.
3. Each group is to contain cases with similar patterns of resource use (this characteristic is generally described as groups being "resource homogeneous").
4. Each group is to contain cases that are similar from a clinical perspective, that is groups must be "clinically meaningful" or "clinically homogeneous" (Fetter, 1991).

These principles are still relevant, albeit with some modifications – for example, what is a "manageable" number of groups today? With improvements in and widespread availability of desktop computing and computer-processing power generally, it is easier to manipulate and report on a larger number of groups than was previously the case. Different countries' classification systems now have between 650 and 2500 groups.

Kobel et al. (2011) identified four main reasons why the number of groups in classifications systems is increasing:

1. desire to improve explanatory power;
2. inclusion of same-day activity into the classification;
3. introduction of new treatments and devices; and
4. improving accounting systems, which improve the ability of funders to identify cost drivers.

Fetter's first principle (use of routine data) has been critical to the spread and adoption of DRG systems outside the USA. Most countries now have computerized data on hospital inpatient activity using ICD-10, supplemented by country-specific coding systems for procedures. The latter can be "mapped" to the coding systems used in common DRG systems. While the USA's DRG system was the first, there are now a variety of DRG systems in use around the world, some with quite different design characteristics from the original. Within the Asia and Pacific region, country variants have been developed in Japan (DPC) and the Republic of Korea (K-DRG). Australian's system (AR-DRG) has been adopted in a number of countries, including Thailand.

The contemporary criteria for evaluating the performance of DRG classification systems include their resource homogeneity: to what extent do the groups in the classification system contain cases that are similar in terms of resource use (Palmer & Reid, 2001)? This relates to Fetter's third principle, and the fundamental basis of fairness in casemix-based funding. Palmer and Reid (2001) also enumerate other criteria to be used in evaluating classification systems, including the extent to which the classification system explains variability in costs and the number of low-volume groups.

DRGs are relatively poorer in characterizing some areas of inpatient activity, most notably mental health services, so these services may initially be excluded from coverage within the case-based payment system. Other potential clinical areas for exclusion include sub-acute services (e.g. rehabilitation, palliative care) and designated super-specialist services (e.g. heart transplant services).

Even for medical, surgical and maternity care, not all cases will fit well within the classification system: there will be situations where a patient's condition is such that the resources used in treatment will be quite outside the norm. These cases are referred to as "outliers". Identifying the proportion of cases categorized as outliers is another criterion in evaluating a classification system's performance. For example, if a high proportion of patients are deemed outliers, the casemix system may not be performing well in terms of segmenting patients into cost-homogeneous groups.

Case-based payments to pay for hospital activity

Once hospital activity has been described by a manageable number of groups, it is expected that cases falling within each group will consume a similar amount of resources. It is then only a small leap to a policy where payments are made to hospitals on the basis of the expected resource consumption of cases. The caveats here are important: the leap from casemix description to casemix payment can only be made when there are good descriptions of activity, and the costs of hospital resources are well defined and understood. Payment for hospital services that do not meet those criteria (such as teaching, training and research) are often handled outside a case-based payment system. Similarly, not all costs of hospital care might be included within the scope of the DRG definition. For example, additional amenity costs, such as single rooms and entertainment systems, are usually excluded; in some circumstances, physician or pharmacy costs may also be excluded.

Case-based payments can serve a number of objectives:

- to improve transparency of hospital funding, by moving from negotiated bases of funding to funding based on a formula;
- to improve equity of funding between different hospitals (all hospitals funded on the same basis for the same activity); and/or
- to drive improvement in technical efficiency (Geissler et al., 2011; O'Reilly et al., 2012).

The extent to which the last objective (efficiency improvement) is achieved depends on the implementation process and design, particularly

price setting. If the price paid per patient treated is above the prevailing average, there will be no savings, and efficiency improvements will be limited to very high-cost hospitals. The lower the price set, the greater the improvement in efficiency, subject to the set price being achievable and not subject to unanticipated consequences, such as reductions in quality (e.g. with increased readmissions). The price set for case-based payments is thus critical to providing an incentive for more efficient use of inputs (e.g. staff, supplies) and intermediate products (e.g. days of stay, laboratory tests).

Under a case-based payment system, total expenditure is determined by the price paid for each unit of activity (typically measured using DRGs) and the quantity of activity. In capped funding systems, total expenditure is regulated by controls on activity – either direct controls (e.g. by allocating volume caps) or indirect controls (e.g. by allowing the price to fluctuate with volume). Most applications of case-based payments, particularly in the early stages, focus on addressing technical efficiency issues, rather than addressing allocative or social efficiency.

It could be expected that case-based payments would lead to increased hospital activity. This could adversely impact allocative efficiency if the increased activity were of low value, or if it led to increases in hospital funding relative to primary-care funding, when the latter might be a better investment (Starfield et al., 2005). However, there is no consistent evidence that case-based payments increase hospital activity (Palmer et al., 2014), possibly because capping arrangements mitigate volume incentives.

Over time, case-based payments could be used as an instrument to improve allocative efficiency. However, most contemporary applications of case-based payments do not incorporate judgements about the relative value of additional activity. Few applications modify the payment weights used to provide financial incentives for hospitals to preference particular types of activity, or use other strategies to incorporate allocative efficiency considerations into their payment model. Case-based payments can be supplemented by outcome measures, such as patient-reported measures, to allow comparison between the value of treatment and the efficiency of treatment (for example, see Street et al., 2014), and hence assess true (economic) efficiency. However, such approaches are still in their

early days. A more common approach to moving beyond simple cost-based pricing in case-based payments is to incorporate quality (or safety) measures, as discussed below.

Case-based payments have the potential to transform relationships between funders and hospitals. If funding is allocated on the basis of activity (rather than negotiations), then the funder's role is concerned with specifying how the hospital's revenue stream is determined, and the conditions associated with that revenue stream. Specifically, the total amount of revenue a hospital will receive will be determined by the amount of activity and the price paid for that activity (together with any payments not based on activity). In a case-based payment environment, the funder is not allocating a budget, as such – the hospital's budget is developed by the hospital, taking into account estimated activity and therefore revenue. Hospital budgeted expenses should be in line with expected revenues.

Issues in case-based payment design

The essence of case-based payments is summed up in the name: that funding for a hospital should be based on the cases it treats. But there are multiple ways to interpret "based on"; the choices in any jurisdiction will be influenced by the policy objectives being pursued (e.g. transparency, funding equity, efficiency) and the context within which case-based payments are being introduced.

Despite the variability in case-based payment system design, there are four broad principles (based on Averill & Kalison, 1991) that characterize case-based payment arrangements.

1. The amount of revenue a hospital receives varies in some way with its activity.
2. The payment prices for each unit of activity are fixed in advance for the period (usually a financial year) to which they apply.
3. In its stable state (after any phase-in period), the payment prices are not based on the hospital's past or current actual costs, but rather the system's overall costs (potentially adjusted as part of jurisdiction-wide budget considerations).
4. The hospital is responsible for managing within the revenue it receives (retaining surpluses, being accountable for losses).

The way in which case-based payments play out is subject to the policy context in which they are introduced, e.g. the extent of potential savings and the pre-existing funding arrangement. The first major implementation of case-based payments occurred in the USA in 1983 (Russell, 1989), with subsequent major implementations occurring in Australia (Duckett, 1995) and many European countries (Busse et al., 2011).

Each implementation of case-based payments is different, as adaptations are made to account for each country's institutional structure, the weight given to different objectives, and the capacity for health policy development and implementation. These issues are discussed in the next section.

Policy and implementation capacity

A country's policy and implementation capacity will shape several aspects of case-based payment design and implementation (Mathauer & Wittenbecher, 2013).

An important first question is the one of make or buy: whether a country should develop its own casemix classification or adopt a classification developed elsewhere. Locally developed classifications better reflect local, contemporary practice patterns, which may facilitate local acceptance of a policy shift to case-based payments. However, the cost of developing (and maintaining) a local system is high, and typically requires more data than adapting an existing system developed elsewhere.

For smaller countries, a locally developed system may introduce inherent instability in small-cell DRGs. This latter weakness can be partially overcome by smaller countries cooperating to develop a single DRG system that is adopted by all participating countries. The Nordic countries' development of NordDRGs is the stand-out success story of this strategy (Linna & Virtanen, 2011). However, small cells may pose problems even in countries with large populations, as many hospitals are likely to have few cases in these DRGs, and thus face instability in their own monitoring and management.

Imported systems also have weaknesses. Firstly, any imported system needs to be adapted to the local context. As Mathauer and Wittenbecher (2013) point out:

Adaptation is needed because the cost structure of delivering acute care may vary considerably across countries, depending on their level of technology and the degree of labour applied. If cost weights are inadequately adjusted, it may create the wrong incentives.

Hence, international systems need to be reviewed by clinicians for suitability. When Singapore introduced case-based payments, it used Australian DRGs under licence from the Australian Government, which were subject to review by a Clinical Classification Committee (Cheah & Chee, 1999). In contrast, Japan's hybrid payment model includes the home-grown classification system, the DPC (Matsuda et al., 2008). Adapting an externally developed system is resource intensive, both financially and in terms of skill.

When an imported system is a proprietary product, there may be ongoing licensing costs, subject to licensing negotiations. These licensing costs need to be weighed against the attributes and appropriateness of the product, compared to alternative imported products from the public domain, and the costs of developing a product locally.

The quality of coding of patient records will also shape the case-based payment system design. All DRG classification systems have two key elements: distinguishing between different groups of diagnoses and procedures, and distinguishing within a single group of diagnoses or procedures in terms of patient complexity. The latter requires good coding of comorbidities, i.e. "coding depth" (the number of additional diagnoses recorded). Coding depth, as well as "potential coding depth" (the number of fields available for diagnosis or procedure codes), varies between countries (Street et al., 2012). Due to the significant differences in costs between procedures (e.g. heart surgery versus appendicectomy), case-based payments may still be useful even when coding depth is weak (e.g. when no or only one comorbidity is typically recorded). If an externally developed DRG classification system is to be used for case-based payments, the

country may need to introduce a new procedure classification or a mapping algorithm from its own classification to that used in the external DRG system. Similarly, the external DRG classification may be based on ICD-10, when the country still uses ICD-9.

Other aspects of implementation capacity are also relevant, including the capacity of funder staff (whether ministry or insurance fund) to design the case-based payment system, and the capacity of hospital managers to manage in a new environment. The success of case-based payment implementation will, in part, be influenced by the implementation process, notably the stakeholder engagement process. Mechanisms and capacity for this process are therefore important.

Without adequate *information systems and data*, a country cannot proceed to use case-based payments. At a minimum, case-based payments require data on activity; this in turn implies accurate coding of both diagnoses and procedures. There are a number of factors that affect accurate coding, including the adequacy of documentation in clinical records, the availability of skilled coding staff, and clear and consistent coding rules. By definition, under case-based payment systems, coding will affect payment. For this reason, most countries implementing case-based payments introduce coding audits as part of implementation to verify the accuracy of coding. Strategies to create or develop the coding workforce may also be required (Mathauer & Wittenbecher, 2013).

One important information source required for case-based payments is current costs of care. Funders need costing information to estimate cost relativities for different types of care and to inform price-setting. For hospital managers, understanding these costs in relation to the payment price is a necessary step to ensure the financial health of their institutions.

Cost data are most valuable when captured at a granular level of detail, e.g. for each hospital department, and for the specific activities of those departments (typically referred to as patient-level costing). This is not always feasible; hence, some form of estimation or modelling is generally required (Jackson, 2000). There are two main dimensions to costing accuracy. The first is precision of patient identification, ranging from costs assigned to individual patients to costs of individual patients based on a

“class” (e.g. all patients in a nursing unit, all patients in an intensive care unit). The second is precision of cost identification, ranging from costs identified by “time and motion” studies to costs assigned based on broader units (e.g. a day of stay) (Jackson et al., 1999).

Cost modelling is less costly (both in terms of initial set-up and ongoing maintenance) than patient-level costing information. The downside is that the less precise the patient or cost identification used in the modelling, the more the real distribution of costs will be obscured. However, many jurisdictions started planning for case-based payments using cost modelling (see Ibern et al., 1991; Palmer et al., 1991). Australia used patient-level costing information for its initial implementation (Jackson, 2001).

In some countries, patient FFS payment information will be available for some or all patients. Patient charges or fees are influenced by a range of factors, in addition to the underlying costs (Finkler, 1982), and use of charge-based information as a surrogate for costs may introduce distortions in pricing. This is especially so when some elements of hospital services are subject to quite different charging policies compared to other elements, as is the case with pharmaceutical charging in Chinese hospitals (Liu et al., 2000; Meng et al., 2005). Reliance on charges as a surrogate for costs also has weaknesses for internal hospital management (Williams et al., 1982). However, charge information may be the only cost-like information available in the early stages of case-based payment implementation. In the USA Medicare system, pricing took into account the ratio of costs to charges in each hospital in building up cost estimates. In Thailand, initial costing studies also used a cost-to-charge ratio for estimating cost relativities (Khiaochaoen et al., 2011).

Cost information is almost never available for all hospitals. Even patient-level costing systems are normally confined to larger hospitals. Costing studies therefore involve choices about the sample frame and sampling strategy to be used in collecting information. Sampling approaches can be quite variable. For example, in Germany only 6% of hospitals are included in the sample for estimating costs, compared to 62% in Sweden (Busse & Quentin, 2011). Care needs to be taken to ensure that the hospitals used for developing the casemix classification and payment weights are

representative of all hospitals. Another technical issue is which costs are to be recognized in costing studies, e.g. how capital is to be handled.

In a sense, these management and technical capacity considerations can provide guidance about steps to be taken in preparing for transition to case-based payment. The issues outlined above – policy and implementation capacity, coding, data systems and costing – can, of course, be addressed in parallel as part of a coordinated implementation plan.

Design elements

A critical choice in case-based payment system design is *coverage* of the activity measure, such as DRGs (O'Reilly et al., 2012).

Case-based payment implementation may be phased in terms of hospital functions, typically starting with inpatient activity, as this is the largest component of hospital expenditure, and also has the best developed casemix classifications. Other hospital functions typically slated for early phase-in include outpatient services and emergency department activity. Other choices include the length of the phase-in period. The longer the phase-in, the smaller the impact in any year. However, long phase-in periods add to system complexity (maintaining different funding systems in parallel), and may provide opportunities for hospitals that are adversely impacted to lobby for deferring change into the distant future.

There are a number of options for phasing in case-based payments for inpatient activity (O'Reilly et al., 2012; Mathauer & Wittenbecher, 2013):

- phasing of the proportion of inpatient activity covered, e.g. phasing of the number of DRGs subject to case-based payment (and, potentially, uncapped volume) or those with long wait times;
- phasing of the proportion of the average price to be paid under new, standardized arrangements, and what proportion to be paid based on a hospital's own, historic level of funding;
- phasing the nature of costs covered by case-based payments, e.g. non-salary costs might be covered but salary costs might be paid as input-based subsidies. "Shadow funding" arrangements

can also be used, whereby hospitals are advised of what they would have received if the new funding method were implemented;

- phasing of the number of participating hospitals. In some implementations of case-based payment, such as the Republic of Korea (Kim, 2012), initial participation in the case-based payment arrangement was voluntary; and/or
- phasing the proportion of patients covered by the scheme. Options might include patients paid for by particular funders, or selected on some other characteristic (e.g. patients over 70).

Each of the phasing-in arrangements has risks and benefits. For example, when the phase-in is based on volunteer hospitals, they may not be representative of the wider population of hospitals, so prices established for the volunteer hospitals may be problematic when applied to a wider group. If phasing-in arrangements are for a subset of activity, depending on the payment system design, there may be an incentive for hospitals to preference activity that receives additional case-based payments or that is not subject to capping arrangements.

One approach to phasing in by patient group is to phase in those groups of diagnoses (or groups of DRGs) where care-paths or normative treatment patterns have been developed. This latter approach can lead to a quite protracted implementation phasing, as developing care-paths for all conditions takes considerable time. It also has the weakness that care-paths might be developed only for patients without comorbidities, and this might represent a relatively small proportion of some patient groups. While it may not be appropriate to phase in case-based payments using a care-path approach, care-path development may still be an appropriate management strategy for individual hospitals (Cook et al., 2014).

The phasing-in pace of case-based payments will be influenced by the capacity of both funders and hospitals to adapt to the new system. Whatever phasing-in arrangement is adopted, it should be recognized that full implementation of case-based payments will not be achieved in one year. Hence, a clear plan for the overall pace of implementation will be required.

Pricing is the essence of case-based payments. The first step in pricing involves developing a set of price relativities (or direct prices) for each activity to be paid (for inpatient activity, this requires a price or relativity for each DRG). When relativities are used, they are converted into a price for each DRG by multiplying the relativity for each DRG by a “base price”, set as part of the policy or budgeting process.

Prices or relativities can be derived from in-country costing studies, or the relativities can be imported (with or without minor adjustments) from those used in other countries (for example, see Cots et al., 2000). Pricing policies require establishing payment rules for those cases that are not well described by the classification system used (“outliers”). Other aspects of pricing design include whether a single price model will be introduced, or whether pricing will have fixed and variable components. Pricing is a dynamic process, and relative prices must be reviewed on a regular basis to account for the introduction of new technologies.

Establishing prices involves two basic choices. The first is the pricing benchmark that hospitals have to meet. Is it the average cost of an admission, or a more ambitious target, such as 10% below the average? The second is the treatment benchmark that hospitals have to meet. Under case-based payments, they are to be paid according to the type of patients they treat. But are they paid according to a pricing structure related to what care currently costs or what care should cost? Are they paid only for providing high-quality care?

When case-based payments are introduced in the context of significant budget reductions, such as Australia in 1993 (see Duckett, 1995), prices are set below contemporary average costs. Even when setting prices based on contemporary average costs, there is a question of whether the average should be adjusted to exclude acknowledged inefficiency in high-cost hospitals (Duckett & Breadon, 2014).

Case-based payments have an implicit assumption of homogeneity across hospitals: that the safety and quality of care provided is the same across all hospitals, and that hospitals will not change the quality or safety of care in response to the introduction of case-based payments. There is scant evidence of changes to measurable quality post-implementation

(Palmer et al., in press), but critics of case-based payments often argue that this will be a perverse consequence of implementation.

The USA has pioneered the practice of incorporating adjustments for quality into pricing mechanisms. USA Medicare has revised the DRG algorithm to exclude certain complications of care from affecting DRG assignment, thus effectively creating a “non-payment for non-performance” policy (Cromwell et al., 2011). The financial impact of the new Medicare rules on hospitals was relatively small in dollar terms (McNair et al., 2009), but the impact on hospital behaviour was reputed to be stronger, as hospitals sought to avoid reputational risk associated with a quality-related financial penalty, however small (Frølich et al., 2009). A further enhancement of “non-pay for non-performance” would be to exclude payments for treatments known to be clinically ineffective (Elshaug et al., 2012; Prasad et al., 2013) or for readmissions (Averill et al., 2009; McNair & Luft, 2012).

Although the evidence on “pay for performance” (P4P) is still weak (Tanenbaum, 2009), the logic of incorporating quality incentives into case-based payments is strong, and a robust pricing framework can be used as a platform to introduce incentives (and disincentives) for a range of goals, other than technical efficiency (Duckett, 2008). Quality adjustment to DRG prices can also facilitate better alignment of regulatory incentives designed to promote quality and financial incentives (Duckett, 2014).

A simpler approach to incorporating quality considerations into case-based payments is to provide an incentive for hospitals to participate in a hospital accreditation programme, or to require participation in such a programme as part of the conditions of funding.

Finally, pricing of hospital care needs to account for the relationship between hospital payment, other revenue sources (e.g. pharmaceutical revenue) and physician payments. The relationship between case-based payments and physician payment is particularly important, given a physician’s ability to influence care, and the issues that may potentially arise if physician and hospital incentives are misaligned (Blake & Carter, 2003; Sowers et al., 2013).

A fundamental choice in case-based payment design is whether total hospital expenditure is capped or uncapped. Case-based payments in the USA Medicare scheme are uncapped, with no direct limits placed on spending through volume or expenditure controls. Implementations in other countries have often involved some form of expenditure capping through hard- or soft-volume caps – the distinction being whether control is exercised within the budget year (hard caps) or lagged and potentially avoided (soft caps). Capped case-based payment systems are sometimes referred to as ABF or activity-based budgeting, emphasizing that the process is about allocating a fixed budget or financial allocation fairly, not funding any level of activity.

When case-based payments were introduced in Australia, a hard activity cap was initially imposed at the state level (Duckett, 1995). Subsequently, maximum caps were set for each hospital (McNair & Duckett, 2002).

The most important benefit of activity capping arrangements is that they automatically cap planned expenditure. In this way, case-based payment arrangements give the same level of spending certainty provided by global budgets and other hospital budgeting approaches. Activity and expenditure caps also ensure that hospital expenditure growth is moderated.

Allocation of activity caps is an important planning tool. Activity caps, however, may lead to an imbalance between patient demand and funded supply, creating waiting lists or queues, and potentially rationing access.

An important design choice is the extent of pricing adjustments beyond those incorporated in classification design. These are generally for legitimate and unavoidable factors that influence the cost of care. Typical adjustments are limited to patient-related factors, such as the additional costs of treating patients from remote areas (because, for example, discharge may be delayed), or from particular patient groups that speak a different language or have other factors influencing cost of care (in Australia, treatment of Aboriginal patients results in such a loading). In some implementations of case-based payment, hospital-specific factors, such as a loading for teaching hospitals, are also allowed. In the USA, which does not have UHC, additional allowances are paid for hospitals that admit

higher-than-average proportions of low-income or uninsured patients (“disproportionate share hospitals”). These payments have been criticized for being poorly targeted (Fonkych & Melnick, 2010).

Hospital-specific adjustment factors may undermine the incentives associated with case-based payments, as it is difficult to disentangle whether the additional costs being claimed are the result of inefficiency or are legitimate and unavoidable. A better approach to paying for the additional costs of teaching hospitals is to identify, measure and pay for teaching and research activities, thereby supporting them directly.

Use of multiple adjustment factors may undermine transparency or legitimacy of the system. Another risk with adjustments is that once implemented, they may be difficult to remove.

Evaluation and monitoring

As with any system of hospital funding, management of case-based payments requires control systems and feedback loops.

Setting budgets or funding formulae needs to be accompanied by *monitoring* adherence to allocated funding. This requires establishing funding rules and a governance framework (e.g. see <http://www.health.vic.gov.au/hospital-performance>). Hospitals respond to the rigour of performance controls, and the benefits of ABF can be vitiated if there are soft-budget constraints or expectations of “bail-outs” (Shen & Eggleston, 2009; Eggleston et al., 2009).

Case-based payments and other financial-reward systems carry an inherent risk of evoking inappropriate responses through adverse selection or moral hazard. An example of adverse selection is a hospital favouring the provision of care to patients who are more likely to be profitable, to the detriment of those patients who are more likely to be unprofitable. An example of moral hazard is hospitals putting less effort towards reducing costly and potentially avoidable events (e.g. in-hospital injuries), as a result of knowing that financial compensation will be provided for them.

Because case-based payment systems pay for activity, depending on their design and the extent of activity capping, they may create incentives to expand activity in a way not consistent with the funder's strategic plans. Even in capped designs, to the extent hospitals have autonomy over the mix of services they provide, hospitals may also change their casemix in a way not consistent with funder's plans. In both cases, hospitals may be simply responding to the financial incentives created for them – if they identify a big gap between their marginal costs and the payment reward, they will have an incentive to expand in the relevant DRGs or specialties.

The design of the funding system needs to consider the ways hospitals might respond to case-based payments, and account for where these payments are vulnerable to inappropriate or undesirable responses.

Evaluation that monitors the impacts of case-based payments on the broader health system is thus an important component of such a system. By design or by accident, case-based payments can have a positive or negative impact on many aspects of a health system's performance. For example, improvements in one hospital's cost-efficiency might be a result of case-based payments, but at the expense of increases in total health expenditure. Programme evaluation is a way to inform stakeholders about any undesirable effects of case-based payments, and to facilitate positive changes in hospitals and the health system.

Previous evaluations of the impacts of case-based payments have shown increased inappropriate admissions, readmissions and shifting care to post-acute settings (Cots et al., 2011; O'Reilly et al., 2012; Palmer K, et al. 2014.). Where post-acute services are not within the country's benefit package, shifting care to this setting may have adverse equity consequences. Case-based payments also carry the risk of perverse responses: rather than addressing inefficiency, responses could involve "gaming" and other inappropriate system responses (Simborg, 1981; Steinbusch et al., 2007; Cots et al., 2011). The evaluation design should thus also include systems to audit data to be used for case-based payments. Where case-based payments are being phased in, hospitals may shift activity to services not covered by the case-based payment arrangements, thus circumventing expenditure controls.

Implementation challenges

Kimberly highlighted the importance of context in his 1993 book on the introduction of case-based payments in Europe. He cited Marmor and Plowden (1991):

Ideas do not travel well because they are good or bad, clever or dumb. Ideas are elements in policy warfare whose take-up is determined not by their intrinsic validity but by the local setting – its culture, present moods and circumstances, and structures.

To these three contextual attributes (culture, contemporary mood, structures), Kimberly added the existence of champions, user networks and an international network of DRG supporters. Fifteen years later, a second review of case-based payment innovation identified similar factors as affecting implementation (D'Aunno et al., 2008).

Introduction of case-based payments, as with any policy change, involves political considerations. Who will be the advocates? Who will be the opponents? It will inevitably involve a change in the distribution of resources (from less efficient to more efficient services). Which hospitals will be the precise winners? Which will lose? Will changes associated with the introduction of case-based payments change personal remuneration for physicians or other groups?

Implementation of case-based payments is not a purely technical process, and will be affected by the social and political context. Because contexts are country-specific, the factors to be taken into account will vary, as will timing considerations and strategies for phasing in case-based payments. Implementation will be facilitated, though, with careful planning and understanding of potential stakeholder reactions, obtained through stakeholder engagement.

Conclusion

Introducing case-based payments involves a number of design choices. Different countries have made different choices about the issues discussed in this chapter as they have implemented case-based payments. These choices are explored in the next chapter.

References

- Averill RF, Kalison MJ (1991). Structure of a DRG-based prospective payment system. In: Fetter RB, Brand DA, Gamache D, editors. *DRGs: their design and development*. Health Administration Press.
- Averill RF, McCullough EC, Hughes JS et al. (2009). Redesigning the Medicare inpatient PPS to reduce payments to hospitals with high readmission rates. *Health Care Financing Review*. 30(4): 1–15.
- Blake JT, Carter MW (2003). Physician and hospital funding options in a public system with decreasing resources. *Socio-Economic Planning Sciences*. 37(1): 45–68.
- Busse R, Quentin W (2011). Moving towards transparency, efficiency and quality in hospitals: conclusions and recommendations. In: Busse R, Geissler A, Quentin W et al. editors. *Diagnosis-Related Groups in Europe: moving towards transparency, efficiency and quality in hospitals*. Open University Press.
- Busse R, Geissler A, Quentin W et al. editors (2011). *Diagnosis-Related Groups in Europe: moving towards transparency, efficiency and quality in hospitals*. Open University Press.
- Cheah J, Chee YC (1999). Casemix – for better or for worse. *Singapore Medical Journal*. 40(1): 9–12.
- Cook D, Thompson JE, Habermann EB et al. (2014). From ‘solution shop’ model to ‘focused factory’ in hospital surgery: increasing care value and predictability. *Health Affairs*. 33(5): 746–755.
- Cots F, Chiarello P, Salvador X et al. (2011). DRG-based hospital payment: intended and unintended consequences. In: Busse R, Geissler A, Quentin W et al. editors. *Diagnosis-Related Groups in Europe: moving towards transparency, efficiency and quality in hospitals*. Open University Press.
- Cots F, Elvira D, Castells X et al. (2000). Medicare’s DRG-weights in a European environment: the Spanish experience. *Health Policy*. 51(1): 31–47.

Cromwell J, Trisolini MG, Pope GC et al. editors (2011). *Pay for performance in health care: methods and approaches*. RTI Press.

D'Aunno T, Kimberly J, De Povourville G (2008). The global diffusion of casemix. In: Kimberly J, De Povourville G, D'Aunno T, editors. *The Globalization of Managerial Innovation in Health Care*. Cambridge University Press.

Duckett S (1995). Hospital payment arrangements to encourage efficiency: the case of Victoria, Australia. *Health Policy*. 34: 113–134.

Duckett S (2008). Design of price incentives for adjunct policy goals in formula funding for hospitals and health services. *BMC Health Services Research*. 8(72).

Duckett S (2014). The need for a regulatory rethink: a perspective from Australia. *Future Hospital Journal*. 1(2): 117–121.

Duckett S, Breadon P (2014). *Controlling costly care: a billion-dollar hospital opportunity*. Grattan Institute.

Eggleston K, Shen YC, Lu M et al. (2009). Soft budget constraints in China: evidence from the Guangdong hospital industry. *International Journal of Health Care Finance and Economics*. 9(2): 233–242.

Elshaug AG, Watt AM et al. (2012). Over 150 potentially low-value health care practices: an Australian study. *The Medical Journal of Australia*. 197(10): 556–560.

Fetter RB (1991). The DRG patient classification system: background. In: Fetter RB, Brand DA, Gamache D, editors. *DRGs: their design and development*. Ann Arbor, MI; Health Administration Press.

Fetter RB, Shin Y, Freeman JL et al. (1980). Case mix definition by diagnosis related groups. *Medical Care*. 18(2)(Suppl): 1–53.

Finkler SA (1982). The distinction between cost and charges. *Annals of Internal Medicine*. 96(1): 102–109.

Fonkych K, Melnick G (2010). Disproportionate share hospital subsidies for treating the uninsured. *Medical Care*. 48(9): 809–814.

Frølich A, Talavera JA et al. (2007). A behavioral model of clinician responses to incentives to improve quality. *Health Policy*. 80(1): 179–193.

Geissler A, Quentin W, Scheller-Kreinsen D et al. (2011). Introduction to DRGs in Europe: common objectives across different hospital systems. In: Busse R, Geissler A, Quentin W et al. editors. *Diagnosis-Related Groups in Europe: moving towards transparency, efficiency and quality in hospitals*. Open University Press.

Ibern P, Bisbel J, Casas M (1991). The development of cost information by DRG – experience in a Barcelona hospital. *Health Policy* 17(2): 179–194.

Jackson T (2000). Cost estimates for hospital inpatient care in Australia: evaluation of alternative sources. *Australian and New Zealand Journal of Public Health*. 24(3): 234–241.

Jackson T (2001). Using computerised patient-level costing data for setting DRG weights: the Victorian (Australia) cost weight studies. *Health Policy*. 56(2): 149–163.

Jackson T, Watts J, Lane L et al. (1999). Data compatibility in patient level clinical costing systems. *Casemix Quarterly*. 1(1): 36–45.

Khiaocharoen O, Pannarunothai S, Zungsontiporn C et al. (2011). Patient-level costing for the Thai Diagnosis Related Group in Thailand: a micro-costing approach. *BMC Health Services Research*. 11(Suppl 1): A2.

Kim YK (2012). Forecasting the future reimbursement system of Korean National Health Insurance: a contemplation focusing on global budget and Neo-KDRG-based payment systems. *Journal of Korean Medical Science*. 27(Suppl): S25–S32.

Kimberly JR (1993). DRGs in Western Europe: lessons and comparisons in managerial innovation. In: Kimberly JR, de Pouvourville G, editors. *The Migration of Managerial Innovation: Diagnosis Related Groups and Health Care Administration in Western Europe*. San Francisco: Jossey-Bass: 340–62.

Kobel C, Thuilliez J, Bellanger M et al. (2011). DRG systems and similar patient classification systems in Europe. In: Busse R, Geissler A, Quentin W et al. editors. *Diagnosis-Related Groups in Europe: moving towards transparency, efficiency and quality in hospitals*. Open University Press.

Linna M, Virtanen M (2011). NordDRG: the benefits of coordination. In: Busse R, Geissler A, Quentin W et al. editors. *Diagnosis-Related Groups in Europe: moving towards transparency, efficiency and quality in hospitals*. Maidenhead: Open University Press.

Liu X, Liu Y et al. (2000). The Chinese experience of hospital price regulation. *Health Policy and Planning*. 15(2): 157–163.

McNair P, Duckett SJ (2002). Funding Victoria's public hospitals: the casemix policy of 2000–2001. *Australian Health Review*. 25(1): 72–98.

McNair PD, Luft HS et al. (2009). Medicare's policy not to pay for treating hospital-acquired conditions: the impact. *Health Affairs*. 28(5): 1485–1493.

McNair PD, Luft HS (2012). Enhancing Medicare's hospital-acquired conditions policy to encompass readmissions. *Medicare & Medicaid Research Review*. 2(2).

Marmor TR, Plowden W (1991). Rhetoric and reality in the intellectual jet stream: the export to Britain from America of questionable ideas. *Journal of Health Politics, Policy and Law*. 16(4): 807–12.

Mathauer I, Wittenbecher F (2013). Hospital payment systems based on diagnosis-related groups: experiences in low- and middle-income countries. *Bull World Health Organ*. 91: 746–756A.

Matsuda S, Ishikawa KB, Kuwabara K et al. (2008). Development and use of the Japanese case-mix system. *Eurohealth*. 14(3): 25–29.

Meng Q, Cheng G et al. (2005). The impact of China's retail drug price control policy on hospital expenditures: a case study in two Shandong hospitals. *Health Policy and Planning*. 20(3): 185–196.

O'Reilly J, Busse R, Häkkinen U et al. (2012). Paying for hospital care: the experience with implementing activity-based funding in five European countries. *Health Economics, Policy and Law*. 7: 73–101.

Palmer G, Aisbett C, Fetter R et al. (1991). Estimates of costs by DRG in Sydney teaching hospitals: an application of the Yale cost model. *Australian Health Review*. 14(3): 314–334.

Palmer G, Reid B (2001). Evaluation of the performance of diagnosis-related groups and similar casemix systems: methodological issues. *Health Services Management Research*. 14(2): 71–81.

Palmer K, Agoritsas T et al. (2014). Activity-based funding of hospitals and its impact on mortality, readmission, discharge destination, severity of illness, and volume of care: a systematic review and meta-analysis. *PLoS ONE*. 9(10): e109975.

Prasad V, Vandross A et al. (2013). A decade of reversal: an analysis of 146 contradicted medical practices. *Mayo Clinic Proceedings*. 88(8): 790–798.

Russell LB (1989). *Medicare's new hospital payment system: is it working?* The Brookings Institution.

Shen YC, Eggleston K (2009). The effect of soft budget constraints on access and quality in hospital care. *International Journal of Health Care Finance and Economics*. 9(2): 211–232.

Simborg DW (1981). DRG creep: a new hospital-acquired disease. *The New England Journal of Medicine*. 304(26): 1602–1604.

Sowers KW, Newman PR et al. (2013). Evolution of physician-hospital alignment models: a case study of comanagement. *Clinical Orthopaedics and Related Research*. 471(6): 1818–1823.

Starfield B, Shi L et al. (2005). Contribution of primary care to health systems and health. *The Milbank Quarterly*. 83(3): 457–502.

Steinbusch PJM, Oostenbrink JB, Zuurbier JJ et al. (2007). The risk of upcoding in casemix systems: a comparative study. *Health Policy*. 81(2–3): 289–299.

Street A, Gutacker N et al. (2014). Variations in outcome and costs among NHS providers for common surgical procedures: econometric analyses of routinely collected data. *Health Services and Delivery Research*. 2(1).

Street A, Kobel C, Renaud T et al. on behalf of the EuroDRG Group (2012). How well do Diagnosis-Related Groups explain variations in costs or length of stay among patients and across hospitals? Methods for analysing routine patient data. *Health Economics*. 21: 6–18.

Tanenbaum SJ (2009). Pay for performance in Medicare: evidentiary irony and the politics of value. *Journal of Health Politics, Policy and Law*. 34(5): 717–746.

Williams SV, Finkler SA et al. (1982). Improved cost allocation in case-mix accounting. *Medical Care*. 20(5): 450–459.

Chapter 3: Implementation experience with DRG-based payments

Soonman Kwon and Changwoo Shon¹



Key points

- Motivations for introducing DRG-based payments or ABF differ across health-care systems. Health-care systems based on budget for hospitals intend to improve transparency and equity in resource allocation, while FFS-based health-care systems intend to contain cost and enhance efficiency. Different intentions for adopting DRG-based payments or ABF can affect the implementation process.
- Context affects the implementation strategy. Each country needs to make decisions about the development of its DRG, such as whether to build or buy; how many case groups to use in the payment system design; whether to implement a pilot programme; and whether to start with public providers or a select number of cases, taking into account the context of its unique health-care system.
- Stakeholder management is important. Private providers receiving FFS payments are usually opposed to DRG-based payments. Hence, strategies to overcome opposition are required.
- Implementation of DRG-based payments or ABF requires a reliable information system and technical capacity for case classification, costing and pricing, etc. Thus, implementation is associated with a continual process of refinement and adjustment.
- Monitoring and evaluation are important for effective implementation. Whether DRG-based payments or ABF achieve the intended goal of efficiency and equity of health system should be closely scrutinized. Each country needs to develop indicators for monitoring and evaluation that can respond to the specific needs of its unique health system.

1 Helpful comments by S. Duckett, H. Hashimoto, J. Langenbrunner, and Supasit Pannarunothai are gratefully acknowledged.

Introduction

The purpose of this chapter is to understand the implementation process, including the context and motivation, of a case-based payment system in Asia. In addition, institutional arrangements, such as implementation strategy, classification system and evaluation mechanisms, in six high-income and upper-middle-income countries in the Asia and Pacific region will be discussed. These countries include Australia, Japan, New Zealand, the Republic of Korea, Singapore and Thailand.

Context

The purpose and context of introducing DRG-based prospective payments in diverse health systems have been variable. The purpose of implementation in countries changing from FFS to DRG payments is mainly cost containment and efficiency improvement. Countries where providers are reimbursed by FFS payments without an effective form of cost control tend to adopt DRG-based payment systems as a way of controlling health-care expenditure. However, for countries changing from a global budget system to ABE, the purpose of DRGs has focused on transparency and fairness in budget allocation. Nevertheless, most of the six countries in the Asia and Pacific region have been commonly concerned about health-cost containment (Mathauer & Wittenbecher, 2012; Wagstaff, 2011; Ellis & Vidal-Fernandez, 2007).

Cost containment and efficiency

The Republic of Korea has seen improved access to health care as a result of the universal health insurance scheme. Due to the increasing demand for health care, the ageing population, overprovision under FFS payments, and high-cost medical technology, this country was concerned about rapidly increasing health-care expenditure. The DRG payment system was viewed as a system that would incentivize a more efficient use of health-care resources.

The Republic of Korea spent 5.6% of its GDP on health care in 2004, a significant increase from 4.1% in 1985. Although the level of expenditure was still low, health expenditure per capita had increased more rapidly than in other OECD countries. In order to control the increasing health-care

expenditure incurred from FFS, the Republic of Korea adopted the DRG payment system, initially just for a few surgeries.

Equity and transparency

Australia, New Zealand and Thailand have focused on improving funding mechanisms for more transparent resource allocation. To this end, they developed tools to increase transparency through patient classification and measurement of hospital output, using the DRG payment system.

Australia has a long history of casemix funding that is “paying hospitals as a benchmark price for the mix of patients (cases) they treat” (Hillless & Healy, 2001). Before the implementation of casemix funding, the budget of public hospitals was determined at the state level through a mix of negotiations, history, and politics (Duckett, 1998). The DRG system was adopted in Australia for reasons of improved efficiency, equity of resource allocation, promotion of appropriate care, and maximization of health-care quality (DoHV, 2014). State and federal governments viewed DRGs as an important measurement tool for public hospital outputs at a national level (Coory & Cornes, 2005).

In 2009, the Australian National Health and Hospitals Reform Commission recommended that ABF be adopted nationally as the principal mechanism of funding for public and private hospitals. Until then, case-based payments had only been adopted in some Australian states (most notably Victoria). Moreover, substantial variations in hospital costs were still being found in previous studies, and hospitals were being pressured to improve efficiency (Erlandsen, 2007; Gabbitas & Jeffs, 2007; Novak & Judah, 2011).

In Thailand, the DRG-based payment system was first introduced to the Low Income Card (LIC) scheme in 1998, based on the principle of equity in budget allocation. Subsequently, the system was ready for scaling up as the provider payment for inpatient services of the Universal Coverage (UC) scheme in 2002. As DRG-based payments were designed to control costs of medical treatment, policy-makers and insurers supported the implementation (Pongpirul et al., 2011).

Singapore used per diem funding for public hospitals, until the introduction of DRG payments to the public health-care system in 1999. The new system has allowed Singapore's Ministry of Health to better target subsidies for medical conditions that require more resources for treatment (Kiang, 2002). The Ministry allocates hybrid block grants to public hospitals – that is, some part of the annual budget is given in the form of a block, with the remainder paid on a piece-rate basis for more than 70 diseases, based on DRGs, including inpatient and day surgery (Haseltine, 2013).

Improving hospital information systems

Japan's DPC system, which is a combination of DRG, per diem and FFS payments, does not provide strong incentives to reduce use of health-care resources (Hamada, Sekimoto & Imanaka, 2012). Although cost containment was a concern in Japan, the major goal of the prospective payment system (PPS) was related to improving hospital management and information systems. The purpose of the DPC/per diem payment system (DPC/PDPS) was to deliver quality health care and to efficiently construct a clinical database by standardizing information platforms (with standardized clinical data), thereby improving the transparency of hospital activities. Standardization, transparency and accountability are the keywords underpinning the aims of the DPC project (Nishioka, 2009).

One of the main drivers for the expansion of DPC payment was the hospital-specific conversion factor, which adjusts for the difference between the DPC rate and the payment hospitals would have received under FFS (Ikegami, 2015). The hospital-specific conversion factor will be terminated in 2018. Recent reforms to the DPC intend to introduce new incentives for hospitals to improve quality and performance, and also new hospital-specific factors related to a hospital's performance and contribution to regional health-care needs (Hashimoto, 2014).

Approaches to implementation (piloting, phasing, rolling-out)

Phased-in strategies with the expansion of DRG categories and hospital participation

In 1997, the Republic of Korea launched a pilot DRG programme for inpatient care, covering five diseases categories. The pilot, which

was a voluntary participation programme, provided more generous margins than FFS to overcome provider opposition. Considering that some uncovered services were bundled in the DRGs and extra billing was banned, the pilot programme had the effect of expanding benefit coverage (Kwon, 2003). In 2002, the DRG payment was extended to seven disease categories, including: lens procedures; tonsillectomy and/or adenoidectomy; appendectomy; cesarean section; inguinal and/or femoral hernia procedures; appendectomy; and anal and/or perianal procedures. These seven disease categories were further divided into 83 subcategories, to reflect the age and severity of patients. A compulsory DRG payment system has not been implemented in the Republic of Korea due to provider opposition. In 2010, the seven disease categories accounted for 7.3% of inpatient cases. In 2012, DRG payment for these disease categories was implemented for all clinics and hospitals; in 2013, this was extended to all general hospitals.

The Republic of Korea has also applied another type of DRG system, very similar to Japan's DPC system – namely the “New DRG” payment system. The Government has adopted a different strategy for this payment system: it covers 550 disease categories, which account for approximately 95% of all DRG groups in inpatient care. In 2013, the New DRG payment system applied to all 40 local government hospitals.

In Singapore, casemix was first piloted for public-sector hospitals in 1998. After one year, all day surgery and inpatient services provided in public hospitals, with the exception of Woodbridge Hospital and Ang Mo Kio Community Hospital, were funded using the casemix system based on the AN-DRG (Sahadevan et al., 2004). This system included inputs from the Clinical Classification Committee, which comprised senior clinicians from the public sector (Siow, 2001). Outpatient services, rehabilitation services and other programme-based services are still excluded from Singapore's DRG system (MoHS, 2014).

Phased-in strategies with the expansion of hospital participation

Japan started piloting DRG-based payments in 10 hospitals, initially with 183 groups and later with 532 groups, in 1998 (Imai, 2002; Okamura et al., 2005). The pilot programme, which aimed to test the validity of a DRG/PPS-

like system before implementation, found a decrease in the LOS despite per-diem payment (Kondo & Kawabuchi, 2012). Following the results of the pilot programme, Japan's Ministry of Health, Labour and Welfare (MHLW) implemented DPC payment, which is a mix of prospective payment and FFS, in 82 hospitals in 2003 (Kuwabara et al., 2006; Okamura et al., 2005). These hospitals (80 university hospitals and two national hospitals) provided advanced medical care, education and research, and had a strong influence on the Japanese medical care system. In terms of beds paid by DPC payment, the number has rapidly increased from 66 000 beds (in 82 hospitals) in 2003 to 480 000 beds (in 1505 hospitals) in 2012.

Phased-in strategies with the expansion of funding schemes

In Thailand, DRG Version 1 was introduced for resource allocation as part of the Low Income Card scheme, a welfare scheme for the poor. The DRG was developed to be an important mechanism for provider payment for inpatient care, and was nationally implemented under Thailand's Universal Coverage scheme in 2002 (Pongpirul et al., 2011). In 2003, DRG Version 3 (including 1200 DRGs) was introduced, and payment to all hospitals by the National Health Security Office was implemented for inpatient care services within a global budget of the Universal Coverage scheme (Pannarunothai, 2010). Under the global budget, DRG payment is based on actual relative weight (RW) points earned by providers, which are mostly public (Tangcharoensathien et al., 2010). For the Civil Servant Medical Benefit Scheme (CSMBS), each hospital has a different base rate according to the number of cases within the total budget, in order to reduce incentives for a hospital to increase its case volume during the pilot programme (Mathauer & Wittenbecher, 2013). It was announced that this Scheme would start using DRGs for reimbursement of inpatient services in 2007 (Sakunphanit, 2008). In 2010, DRG Version 5 was released for acute, sub-acute and psychiatric cases (Pannarunothai, 2010); in this version, 2700 case groups are included within acute cases (Mathauer & Wittenbecher, 2013).

Phased-in strategies with the expansion of states participation

Australia began piloting the USA's DRG classification system in 1985, and has since developed its own standardized classification system (AR-DRG), which currently has 698 individual categories. The first national initiative in Australia dates back to 1988, when the Australian Department of Health

incorporated DRGs into the 1988–1993 Medicare Agreements between the Federal Government and the eight states and territories. The Department of Health began funding the development of an Australian DRG system (AN-DRG) in 1992. Promoted by the Commonwealth, all states and territories have incorporated the DRG system into their formula for funding public hospitals. Partly due to variations between states on the ABF formula, a “national efficient price” was introduced in 2012. This price is published annually by the Independent Hospital Pricing Authority (IHPA), an independent government agency for public hospital services.

Table 1 summarizes when and how DRG payment systems were introduced in the six developed health-care systems in the Asia and Pacific region.

Table 1. Timeline and process for introducing DRG payments

	Australia	New Zealand	Thailand	Republic of Korea	Japan	Singapore
Year of pilot/research programme*	1985	1998	A&E: 1993	1997(9)–2001(7)	1998–2003(183)	1998
Year of initial introduction of DRG payment**	1993 (Victoria) 2012 (nationally)	2001 (AR-DRG 6.0)	LIC: 1998 UCS: 2002 CSMBS: 2007	2001–2013	2003	1999
Development of DRG	Build	Buy	Build	Build	Build	Buy
Process of introducing DRG payment	Inpatient service in public hospitals and private hospitals	Publicly funded hospitals	Inpatient service in public hospitals (and voluntary private hospitals)	Voluntary basis in all clinics/hospitals before 2012; compulsory participation since 2013	Designated hospitals; i.e. specific functional hospitals, since 2003	Inpatient and day surgery services in public hospitals and national centres
Reimbursement mechanism for inpatient care	FFS, DRG	FFS, DRG, global budget	FFS, DRG, global budget (UCS: hard) (CSMBS: soft)	FFS, DRG, per diem	Per case, per procedure, per diem, FFS	FFS, DRG

Table 1. Timeline and process for introducing DRG payments (cont.)

	Australia	New Zealand	Thailand	Republic of Korea	Japan	Singapore
Characteristics of health-care system						
Access to hospital services	Universal	Universal	Universal	Universal	Universal	Universal
Provision of hospital services	Public (55%) Private (45%)	Predominantly public sector	Predominantly public sector (70%)	Predominantly private sector	Predominantly private sector	Public sector (ownership: private)
Main source of financing	General tax	General tax	General tax	Social insurance	Social insurance	Private insurance, government subsidies

* The numbers in parentheses refer to the number of DRGs

** A&E: accident and emergency; LIC: Low Income Card; UCS: Universal Coverage Scheme; CSMBS: Civil Servant Medical Benefit Scheme

Source: Authors' summary

Political economy and stakeholders

The political economy and stakeholder engagement are both important for the success of payment system reform (see Chapter 2). Governments typically focus on cost-effectiveness; medical providers prioritize clinical autonomy and technical aspects, such as accuracy of diagnosis, appropriateness of classifications, and health outcomes; and patients want quality medical services with clear communication at a low cost. Governments usually play a leading role in countries with a tax-based financing, such as The National Health Service, where public hospitals are the major health-care providers. In contrast, private health-care providers are influential in countries with social health insurance, where private providers are often the majority.

In Australia, the Federal Government funds and administers the national health insurance scheme (Medicare) and the Pharmaceutical Benefits Scheme. In terms of ABF, each state government is responsible for system-wide planning of the required range, type and volume of public hospital services within its state. States are also the majority funder of public

hospitals, with the Federal Government contributing about 45% of funding. Neither the Federal Government (through its funding role) nor the IHPA (through its role in price determination) has any direct role in determining which services will be funded locally or which services will be provided. These decisions are shared between state governments and local hospital networks, although the IHPA determines the national efficient price for services based on activities in public hospitals (Health Policy Solution, 2011).

In New Zealand, district health boards in 20 geographic regions are responsible for planning, purchasing and providing health services (Gauld, 2012). These boards together with the Ministry of Health are the main actors in the DRG payment system, and determine which services will be paid by a DRG. The budget level is negotiated by the district health boards and the hospitals (Ettelt et al., 2007).

The Government of the Republic of Korea plays a weaker role in national policy-making than governments in countries with The National Health Service. After the Republic of Korea's pilot programme, the Government tried to implement a compulsory DRG payment system, but faced provider opposition. During the voluntary DRG programme, the Government offered a more generous payment (fee) for the DRG system than FFS to encourage providers to join. In 2011, it was finally decided by the Committee of Vision for Health Care Reform – which is comprised of medical provider groups, consumer groups and public representatives – that all hospitals would join the compulsory DRG payment system for selected disease categories. Following this agreement, the Government finally implemented the DRG payment system for all hospitals (although for only seven DRGs) in 2013.

In Japan, the role of government is important as the MHLW is in charge of managing the system for DPC payments (i.e. hospital data collection, qualification management, etc.). In terms of qualification management, the MHLW decides which hospitals are paid by the DPC/PDPS. Because hospitals must submit information and data (e.g. medical records) to join the DPC/PDPS, most participating hospitals are large ones. As the DPC/

PDPS is a voluntary system, the participating hospitals also have a voice in the implementation of DPC payment.

Classification and coverage

The aim of a patient classification system is to classify and combine a large number of patients into limited groups with similar characteristics. DRG systems are the most widely adopted and explored patient classification system. Although six countries in this chapter have developed their own systems, they share some basic characteristics with the original DRG system (Busse, 2011). The All Patient DRG and the All Patient Refined DRG, developed by the USA Health Care Financing Administration, formed the basis for the AN-DRG, which became the AR-DRG after further modifications (Australian Government, 2004). Australia decided to develop its own patient classification system, described as a performance-oriented hospital financing system. After Australia introduced the AR-DRG, New Zealand and Singapore adopted the system and used it for their own payment methods. These three countries therefore have the same 698 sets of DRGs, consisting of 25 Major Diagnostic Categories (MDCs) and three partitions, using ICD-10-AM (Australian Modification). All classification systems define "partitions" to further divide cases into more homogeneous groups (Busse, 2011). These partitions are usually defined as a way of treatment, such as "surgical", "medical", or "other" treatment.

Japan, the Republic of Korea and Thailand have their own classification systems, which have been adopted from the USA system and modified to meet their own unique circumstances. The Republic of Korea's classification method, the K-DRG, consists of 23 MDCs, one surgical partition and 1880 groups. Among these groups, only seven diseases, which are divided into 78 groups, have been implemented for the DRG payment system. Thailand has more groups to define cases than other country, after moving away from the USA's DRG principle to AR-DRG, which comprises 28 MDCs, two partitions and 2450 groups (NHSO, 2011). In addition, Thailand uses ICD-9-CM (Clinical Modification) and ICD-10/ICD-10-TM (Thai Modification) for procedure and diagnosis, respectively. Japan's DPC consists of 18 MDCs, two partitions and 2241 groups. Japan also has many categories to cover 516

diseases. Table 2 describes the basic characteristics of patient classification systems in the six health-care systems.

Table 2. Patient classification systems

	Australia	New Zealand	Thailand	Republic of Korea	Japan	Singapore
Classification	AR-DRG	AR-DRG	Thai-DRG	K-DRG	DPC	AR-DRG
Codes*	ICD-10-AM	ICD-10-AM	ICD-9-CM ICD-10-TM	ICD-10-CM	ICD-10-CM	ICD-10-AM
Diseases	All	All	All	7	516	All
Groups** (DRG)	698 (based on 2014)	698 (based on 2014)	2700 (based on 2013)	78 (out of 1880 based on 2013)	2241 (out of 2927 based on 2013)	698 (based on 2014)
MDCs	25	25	28	5 out of 23	18	25
Partitions***	3	3	2	1 (surgical) of 3	2	3

* AM: Australian Modification; CM: Clinical Modification; TM: Thai Modification

** AR-DRG consists of inpatient (660 groups) and same-day/short-term (38 groups)

*** 3 means surgical, medical and other; 2 means surgical and medical; 1 means only surgical

Source: Authors' summary

Another classification issue relates to the variables involved in the classification process. Factors needed to identify each classification group include clinical variables, demographic and administrative variables, and sometimes resource-use variables. In clinical information, principal diagnosis and procedure are commonly considered. The principal diagnosis is originally defined as the diagnosis responsible for occasioning the patient's episode of care in hospital (AIHW, 2008). In reality, however, principal diagnosis is generally defined as the main reason for the stay in hospital. For demographic and administrative variables, age, gender, discharge status (except in the Republic of Korea and Japan), and birth weight of newborn babies (except in the Republic of Korea) are commonly considered; mental health legal status is considered only in AR-DRG. In terms of discharge status in AR-DRG, the discharge summary document

should show why the patient was admitted to hospital and how they were treated, as well as clinical outcomes. The six countries in this chapter limit the number of severity levels, e.g. up to three in Tw-DRG; up to five in AR-DRG and Thai-DRG.

There are four steps of classification common to most systems. First, extremely high-cost cases, such as liver transplants, are allocated to a special category of groups called "Pre-MDCs". Second, all cases are allocated to mutually exclusive MDCs based on the principal diagnosis. Third, if the cases require an "operating room" procedure, they are separated into a "surgical" partition. If not, they are allocated to a "medical" partition. Only when cases do not fit in with any partition, can they be named "other" partition. Fourth, characteristics such as age, complication and comorbidity are considered in order to ensure cases are classified according to their resource consumption. Table 3 shows the classification variables and the number of severity levels in the six health-care systems.

Table 3. Classification variables

	Australia	New Zealand	Thailand	Republic of Korea	Japan	Singapore
<i>Clinical information</i>						
Principal diagnosis	✓	✓	✓	✓	✓	✓
Procedure	✓	✓	✓	✓	✓	✓
Type of service provided					✓	
Ancillary treatment					✓	
Neoplasms/Malignancy	✓	✓	✓			✓
<i>Administrative and demographic information</i>						
Age	✓	✓	✓	✓	✓	✓
Gender	✓	✓	✓	✓	✓	✓
Discharge status	✓	✓	✓			✓
Birth weight (newborn)	✓	✓	✓		✓	✓
Mental health legal status	✓	✓				✓
<i>Resource-use information</i>						
LOS/Same-day status*	✓					
Severity levels	5	5	5	4	-	5

* LOS: Length of Stay

Source: Authors' summary

Costing and pricing

Implementation of DRG payment requires reliable data and information systems. As costing/pricing for DRG systems is based on activity and resource use, accurate coding is one of the core issues in most countries. Costing of hospital patients is the process of identifying the inputs used for treatment and applying the costs of those inputs to the delivery of patient care (outputs) (IHPA, 2014). Although a DRG is assigned based on diagnosis and procedure coding using the ICD codes, other components, such as LOS and discharge status, can be used for price adjustment. An outlier system with different definitions of outliers (i.e. based on LOS or costs) in different countries is adopted because not all patients fit within the classification for pricing or costing.

In Australia, the National Hospital Cost Data Collection is used to produce annual updates of AR-DRG cost weights and estimated average costs for the nation. It is a voluntary collection of hospital cost and activity data coordinated by the Department of Health. Patient costing uses a “bottom-up” approach, where the costs of each service provided to a patient are measured or estimated to obtain the total cost of treating an individual patient. In 2009, 372 Australian hospitals (262 public and 110 private) participated in the data collection (DoHA, 2010). The case-based payment price is different in each state, reflecting state policy differences. Queensland, South Australia and Tasmania use variants of the weights developed as part of the national cost weight study. Victoria and Western Australia, on the other hand, use data from clinical costing systems in their own states to set weights. In AR-DRG, the complications and comorbidity codes constitute the adjustment for severity of illness.

Outliers, which attract additional payments in most states, are designated by the criteria that they clinically or statistically do not fit with most of the other cases assigned to the DRG, and there are upper and lower trim point. LOS or cost is the major measure used to identify outliers (Western Australia, 2011). The common trimming approach used is the “L3H3” method: the low trim point is a third of the ALOS, and the high trim point is three times the ALOS. Same-day and inlier episodes, which are all cases not defined as outliers, are priced at the mean cost per episode. Short-stay

outlier episode calculates the base cost as the average of total operating room, specialist procedure suites and prosthesis costs, and then calculates the cost per diem. For long-stay outlier episodes, the mean inlier cost is assigned to each episode as a base amount. A per diem for each outlier day is calculated using one of two methods (IHPA, 2014):

- In AR-DRGs, where the LOS profile was adequately wide and regular to allow robust regression analysis to be undertaken, the per diem cost was taken as the LOS regression coefficient; this process excluded designated same-day episodes and overly influential observations (as determined by the DFFITS [difference in fit, standardized] statistical measure).
- In the remaining AR-DRGs, cost buckets were partitioned into “fixed” and “variable” (similar to the short-stay outlier process for surgical AR-DRGs), and the per diem cost was taken as the mean variable cost per patient day.

In Thailand, claims data are generally used for calibrating cost weight or RW, which is the unit of resource used for a specific DRG. The higher the RW, the greater the resources utilized, with greater reimbursement (Khiaochaoen et al., 2010). Thai RWs are calculated based on actual services using charges as a proxy for cost of care. For Thai-DRG Version 5, the RW was calculated using 5 946 045 cases (709 383 cases of CSMBS and 5 236 662 cases of Universal Coverage) from 947 hospitals (both public and private). The weights were recalibrated according to each (new) DRG version. In addition to RW, there is another adjustment mechanism with comorbidity, complication, procedure, age, LOS and discharge status in Thailand’s DRG payment system. Under the CSMBS, the reimbursement rate per RW varies by hospital (Tangcharoensathien et al., 2010). A global budget is calculated for each of the 13 public health regions, and inpatient expenditure is reimbursed based on the cost weight of the DRGs generated by each hospital, but capped by the regional global budget (McManus, 2012).

Japanese DPC payment is a complicated per diem system with the rate declining as the LOS increases. The LOS is divided into four payment periods: periods I, II and III, plus the outlier period. The cut-offs for LOS are unique to each DPC and are reset every two years based on data

submitted by the DPC hospitals (Anderson & Ikegami, 2011). For period I, per diem payment is 15% more than the average per diem payment for the 25th percentile of the LOS. For period II, the per diem payment is the average per diem payment for hospital stays up to the ALOS. The payment rate for period III is set at 85% of the previous stage's payment rate (i.e. that of period II) when LOS exceeds ALOS and is up to ALOS plus two standard deviations (outlier period). When the LOS exceeds this limit, reimbursement rates are calculated on a FFS basis (Ishii, 2012). Moreover, the fixed payment is adjusted by a hospital-specific coefficient, which intends to buffer against drastic changes in the payment system and to cope with the difference between actual hospitalization costs and charges (Kondo & Kawabuchi, 2012). Basic hospital stays, tests, diagnostic imaging, medication and injections, and treatments under 1000 points (10 000 yen) are reimbursed with inclusive payments set for each DPC, while medical care, surgery, anaesthesia, radiation therapy and treatments over 1000 points (10 000 yen) are reimbursed by the FFS system (Ishii, 2012).

In the Republic of Korea, the fee schedule has been revised based on claim data and hospital survey data. For example, the fee schedule for 2012 was established based on the 2011 claim data from the National Health Insurance, as well as the 2011 data from hospitals that voluntarily submitted their cost information for services not covered or insured by the National Health Insurance (HIRA, 2012). A total of 22 hospitals submitted cost data (20 hospitals among 71 FFS-paid hospitals and two hospitals among 45 DRG-applied hospitals). Meanwhile, the K-DRG has three periods for flat-rate reimbursement depending on the LOS. Reimbursement rates are calculated at a flat rate, with additional reimbursement when the LOS exceeds the upper threshold, which is the geometric ALOS plus three standard deviations. The formula for the additional reimbursement rate in the Republic of Korea is summarized as follows:

Additional reimbursement rate for upper outlier = $(\text{LOS} - \text{upper limit LOS}) \times \text{standard case fee} \times (1 - \% \text{ of fixed cost}) \times 0.9 / \text{ALOS}$

The K-DRG also includes an adjustment mechanism for the type of hospital, exceeded LOS, and unpredicted cases during holidays or at night. With

regards to these unpredicted cases, the anesthesia fee and procedure or surgery fee add 50% to the standard fee.

Table 4 summarizes the adjustment factors of DRG-based payment in the six Asia-Pacific health systems, excluding factors for classifications such as age, sex, discharge status, etc.

Table 4. Adjustment factors of DRG-based payment

	Australia	New Zealand	Thailand	Republic of Korea	Japan	Singapore
Type of hospital	✓	✓		✓		✓
Hospital specific			✓*		✓	
Emergency in night/holiday				✓	✓	
LOS exceeded	✓	✓	✓	✓	✓	✓
Region	✓	✓				✓
Cost exceeded			✓			
Quality of clinical data reported					✓	

* Not for the Universal Coverage Scheme

Source: Authors' summary

Monitoring and evaluation

For successful implementation of DRG payment systems, quality of care should be monitored in the areas of health outcomes, cost per stay, LOS, discharge and readmission, etc. However, information on monitoring systems and the impact of DRG payment on quality of care are still scarce in most countries in the Asia and Pacific region. Yang (2011) has suggested four dimensions for monitoring quality with claim data: efficiency (changes in inpatient days), cost-shifting, patient shifting/selection, and effectiveness (changes in outliers, disease severity, readmissions).

In Japan in 2010, the MHLW started the Quality Improvement Project to improve the quality of medical care through three hospital organizations: the Japan Hospital Association (JHA), the National Hospital Organization and the All Japan Hospital Association. The Project Committee was established to set quality indicators for the JHA. In 2011, 11 quality indicators, including patient satisfaction and inpatient mortality, were calculated and the results published on the JHA website. There are a total of 25 quality indicators for hospitals, with 13 indicators related to DPC payment (JHA, 2014). These 13 monitoring indicators for DPC hospitals are shown in Table 5.

Table 5. Monitoring indicator for DPC/PDPS hospitals in Japan

Categories	N.	Indicators
Outcome (5)	1	Re-hospitalization in the first 6 weeks after discharge
	2	Aspirin prescribed within 2 days after admission
	3	Aspirin prescribed at discharge
	4	Beta-blocker prescribed at discharge
	5	Statin prescribed at discharge
Process (8)	6	ACEI (Angiotensin-Converting Enzyme Inhibitor) or ARB (Angiotensin Receptor Blocker) prescribed at discharge
	7	ACEI or ARB prescribed
	8	Antithrombotic therapy by end of hospital day 2
	9	Discharged on antiplatelet therapy
	10	Anticoagulation therapy for atrial fibrillation/flutter
	11	Early rehabilitation for ischemic stroke patients
	12	Relievers for inpatient asthma
	13	Systemic corticosteroids for inpatient asthma

Source: JHA (2014) available <https://www.hospital.or.jp/e/qip/>

In the Republic of Korea, the Health Insurance Review & Assessment Service, which is the organization responsible for the review of claim data and assessment of quality, has introduced 18 types of monitoring indicators (see Table 6). It has been mandatory for hospitals to report this information since DRG payments were implemented for all hospitals (HIRA, 2014).

Singapore has also assessed readmission rate under DRG payment as an effective quality measurement for acute hospitals. Data for all DRGs are collected annually, along with data on accident and emergency care and specialist outpatient care (Haseltine, 2013).

In Thailand, several studies found a tendency for intentional errors in hospital coding practices (Pongpirul, Walker, Rahman & Robinson, 2011). It was difficult to conclude the extent of the DRG creep phenomenon through interview study. In this light, the Thai-DRG needs to improve its Health Information System (HIS) and Health Information Technology (HIT) capacity, data and medical record quality, and adoption of national administrative data standards for health (Kijsanayotin, 2013).

In Australia, there are no quality indicators developed exclusively for ABF. The National Safety and Quality Health Service Standards were developed by the Australian Commission on Safety and Quality in Health Care to drive the implementation of safety and quality systems and to improve the quality of health care (ACSQHC, 2014). In addition to the Commission's 10 standards for health-care organizations, indicators of safety and quality also exist, and two of six domains are relevant to clinical outcome: core hospital-based outcome indicators and core outcome indicators for day procedure services. In terms of core hospital-based outcome indicators (see Table 7), the hospitals are routinely monitored and reviewed by the Commission.

Empirical studies were conducted to assess variations among Australian states in the reporting and coding of public hospital data (Coory & Cornes, 2005). These studies found important interstate variation in the percentage of separations (i.e. discharge, transfer, change in care type) in the lowest resource split. It is likely that the high percentage of separations in the lowest resource split is inappropriate and represents under-coding. Another example is coding behaviour under the DRG payment, which showed that the proportion of codes flagged as complications was consistently lower for Queensland than Victoria when comparing 10 common complications for five selected elective procedures (Michel, Cheng & Jackson, 2011).

Table 6. Monitoring indicators of the K-DRG

Categories		Indicators
Quality (13)	Process (5)	Medical problems
		LOS
		Basic health-care services*
		Comparison between DRG costs and FFS costs
		Appropriate use of antibiotics
	Outcome (8)	Medical accidents during hospitalization
		Infection during hospitalization
		Surgical complication or adverse events
		Readmission
		Surgery or procedure for complications during hospitalization
		Emergency department visits after discharge
		ICU utilization during hospitalization
		Mortality rate during hospitalization or within 30 days after discharge
Claim or physician's behaviour (4)		Severity (0–4)
		Casemix index of facilities
		Ambulatory visits before/after discharge
		Ambulatory expense before/after discharge
Clinical documentation (1)		Accuracy of coding and documentation

* Basic health-care services included test items before surgery, as follows.

A. When getting general/spinal anesthesia:

- i. Seven DRGs: CBC, U/A, LFT, Electrolyte, BUN/Cr, PT/PPT or Coagulation, ABO/Rh, Chest PA, EKG
- ii. Lens procedures: (add) Fundoscopy, Keratometry, Slit lamp exam, Tonometry
- iii. Tonsillectomy and/or Adenoidectomy: (add) Impedance Audiometry (for otitis media patients)

B. When getting local anesthesia:

- i. Seven DRGs (except lens procedures): CBC, PT/PPT or Coagulation
- ii. Lens procedures: (add) Fundoscopy, Keratometry, Slit lamp exam, Tonometry
- iii. Tonsillectomy and/or Adenoidectomy: (add) Impedance Audiometry (for otitis media patients)

Source: Authors' summary

Table 7. Core hospital-based outcome indicators in Australia

No.	Indicators
1	Hospital standardized mortality ratio
2	Death in low-mortality DRGs
3	In-hospital mortality for: a) acute myocardial infarction b) stroke c) fractured neck of femur, and d) pneumonia
4	Unplanned/unexpected hospital readmission of patients discharged following management of: a) acute myocardial infarction b) knee replacements c) hip replacements d) paediatric tonsillectomy and adenoidectomy
5	Health-care associated <i>Staphylococcus aureus</i> bacteraemia
6	<i>Clostridium difficile</i> infection

Source: Authors' summary

References

- Anderson G, Ikegami N (2011). How can Japan's DPC inpatient hospital payment system be strengthened? *Lessons from the U.S. Medicare Prospective System*. Washington, DC: Center for Strategic International Studies.
- Australian Commission on Safety and Quality in Health Care (2014). *Indicators of Safety and Quality* (<http://www.safetyandquality.gov.au/our-work/information-strategy/indicators/>, accessed 18 June 2014).
- Australian Institute of Health and Welfare (2008). *National Health Data Dictionary, Version 14*. Canberra (<http://www.aihw.gov.au/WorkArea/DownloadAsset.aspx?id=6442458082>).
- Cheng SH, Chen CC, Tsai SL (2012). The impacts of DRG-based payments on health care provider behaviors under a universal coverage system: a population-based study. *Health Policy*. 107(2): 202–208.
- Cheng TM (2003). Taiwan (China)'s new national health insurance program: genesis and experience so far. *Health Affairs*. 22(3): 61–76.
- Committee, HDS (2006). National health data dictionary version 14. Canberra: Australian Institute of Health and Welfare.
- Coory M, Cornes S (2005). Interstate comparisons of public hospital outputs using DRGs: are they fair? *Australian and New Zealand Journal of Public Health*. 29(2): 143–8.
- Department of Health (2011). *Clinical casemix handbook, 2011–2012*. Western Australia, Perth.
- Department of Health, Victoria (2014). *Casemix funding history* (<http://www.health.vic.gov.au/abf/history.htm#model>, accessed 27 May 2014).
- Duckett SJ (1995). Hospital payment arrangements to encourage efficiency: the case of Victoria, Australia. *Health Policy*. 34(2): 113–34.
- Duckett SJ (1998). Casemix funding for acute hospital inpatient services in Australia. *The Medical Journal of Australia*. 169: S17–21.

Ellis RP, Vidal-Fernandez M (2007). Activity-based payments and reforms of the English hospital payment system. *Health Economics, Policy and Law*. 2(04): 435–44.

Erlandsen E (2007). *Improving the efficiency of health care spending: selected evidence on hospital performance*. OECD Publishing.

Ettelt S, Nolte E, Thomson S et al. (2007). *A review of the role and responsibilities of national ministries of health in five countries*. London School of Hygiene and Tropical Medicine.

Gabbittas O, Jeffs, C (2007). Assessing productivity in the delivery of health systems in Australia: some experimental estimates. Paper presented to 30th Australian Health Economics Conference, Adelaide (<http://www.pc.gov.au/research/completed/public-hospital-productivity/public-hospital-productivity.pdf>)

Gauld R (2012). *The New Zealand Health Care System, 2012*. The Commonwealth Fund.

Hamada H, Sekimoto M, Imanaka Y (2012). Effects of the per diem prospective payment system with DRG-like grouping system (DPC/PDPS) on resource usage and healthcare quality in Japan. *Health Policy*. 107(2): 194–201.

Haseltine WA (2013). *Affordable Excellence: The Singapore Health System*, Brookings Institution Press.

Hashimoto H (2014). *Personal communication*. Japan.

Health Insurance Review and Assessment Service (2012). *Briefing session on 7 DRG payment*. Seoul, Korea.

Health Insurance Review and Assessment Service (2014). *DRG payment academy: an intensive course*. HIRA. Seoul, Republic of Korea.

Health Policy Solution (2011). *Activity based funding for Australian public hospitals: towards a Pricing Framework*. East Melbourne: HPS.

Healy J (2012). *The Australian Health Care System, 2012*. The Commonwealth Fund.

Healy J, Hillless M (2001). *Australia. Health care systems in transition*. European Observatory on Health Care Systems and Policies, WHO.

Healy J, Sharman E, Lokuge, B (2006). *Health Systems in Transition*. Copenhagen: WHO Regional Office for Europe on behalf of the European Observatory on Health Systems and Policies.

Hillless M, Healy J (2001). Australia: health system review. *Health Care Systems in Transition. European Observatory on Health Care Systems*. 3(13): 1–98.

Hopkins S, Irava W, Tin Y (2010). Comparisons of health expenditure in 3 Pacific Island countries using National Health Accounts. *Pacific Health Dialog*. 16(2): 41–50.

Ikegami N (2015). *Personal communication*. Japan.

Imai Y (2002). *Health care reform in Japan*. OECD Economics Department Working Papers, OECD Publishing.

Independent Hospital Pricing Authority (2014). *Technical Specifications 2014–15: National Pricing Model*. Commonwealth of Australia.

Ishii M (2012). DRG/PPS and DPC/PDPS as prospective payment systems. *Japan Medical Association Journal*. 55(4): 279–91.

Japan Hospital Association (2014). *Quality Indicator Project* (<https://www.hospital.or.jp/e/qip/>, accessed 1 June 2014).

Khiaocharoen O, Pannarunothai S, Zungsontiporn C et al. (2010). Casemix classification payment for sub-acute and non-acute inpatient care, Thailand. *J Med Assoc Thai*. 93(7) 849–859.

Kiang LH (2002). *Press room: Minister for Health – addendum to President's address* (http://www.moh.gov.sg/content/moh_web/home/pressRoom/

pressRoomItemRelease/2002/minister_for_health-%20addendum_to_president_%20address.html, accessed 6 June 2014).

Kijsanayotin B (2012). Impact of Thailand Universal Coverage Scheme on the country's health information systems and health information technology. *Studies in Health Technology and Informatics*. 192: 989.

Kondo A, Kawabuchi K (2012). Evaluation of the introduction of a diagnosis procedure combination system for patient outcome and hospitalisation charges for patients with hip fracture or lung cancer in Japan. *Health Policy*. 107(2): 184–93.

Kuwabara K, Imanaka Y, Matsuda S et al. (2006). Profiling of resource use variation among six diseases treated at 82 Japanese special functioning hospitals, based on administrative data. *Health Policy*. 78(2): 306–18.

Kwon S (2003). Payment system reform for health care providers in Korea. *Health Policy and Planning*. 18(1): 84–92.

Lee Y (2011). Introduction and design of DRGs and DRG-based payment system in Taiwan (China). Paper presented to The DRGs Symposium, Seoul, Korea.

McManus J (2012). Thailand's Universal Coverage Scheme: achievements and challenges. An independent assessment of the first 10 years (2001–2010). Synthesis report.

McNair P, Duckett S (2002). Funding Victoria's public hospitals: the casemix policy of 2000–2001. *Australian Health Review*. 25(1): 72–98.

Mathauer I, Wittenbecher F (2012). *DRG-based payment systems in low- and middle-income countries: implementation experiences and challenges*. Geneva, Switzerland: World Health Organization.

Mathauer I, Wittenbecher F (2013). Hospital payment systems based on diagnosis-related groups: experiences in low- and middle-income countries. *Bull World Health Organ*. 91(10): 746–56A.

Michel JL, Cheng D, Jackson TJ (2011). Comparing the coding of complications in Queensland and Victorian admitted patient data. *Australian Health Review*. 35(3): 245–52.

Ministry of Health, Singapore (2014). *Implementation of Casemix in the Public Sector*. (http://www.moh.gov.sg/content/moh_web/home/pressRoom/pressRoomItemRelease/1999/implementation_of_Casemix_in_the_public_sector.html, accessed 2 June 2014).

Ministry of Health and Welfare, Republic of Korea (2012). *Information about the DRG payment system (for medical personnel)*.

National Health and Hospitals Reform Commission (2009). *A healthier future for all Australians – final report*.

National Health Security Office (2011). *The DRGs and the relative weight 2554, Thai DRGs Version 5.0*.

Nishioka K (2009). Diagnosis Procedure Combination as a tool for health reform in Japan. Paper presented to the PCSI conference, Fukuoka, Japan.

Novak J, Judah A (2011). Towards a health productivity reform agenda for Australia. *South Melbourne: Australian Centre for Health Research*.

Okamura S, Kobayashi R, Sakamaki T (2005). Case-mix payment in Japanese medical care. *Health Policy*. 74(3): 282–6.

Pannarunothai S (2010). DRG in Thailand: development up to the Thai Casemix Version 5. *Bangkok: Joint Learning Network in Universal Health Coverage*.

Pannarunothai S (2011). *Each patient counts: should there be a limit for DRG split? A case of Thai DRG Version 3 to 5*. Montreal, Quebec, Canada.

Pongpirul K, Walker DG, Rahman H et al. (2011). DRG coding practice: a nationwide hospital survey in Thailand. *BMC Health Services Research*. 11(1): 290.

Pongpirul K, Walker DG, Winch PJ et al. (2011). A qualitative study of DRG coding practice in hospitals under the Thai universal coverage scheme. *BMC Health Services Research*. 11(1): 71.

Sahadevan S, Earnest A, Koh Y et al. (2004). Improving the diagnosis related grouping model's ability to explain length of stay of elderly medical inpatients by incorporating function-linked variables. *Annals Academy of Medicine Singapore*. 33(5): 614–22.

Sakunphanit T (2008). *Universal Health Care Coverage Through Pluralistic Approaches: Experience from Thailand Social Security Extension Initiative in East Asia*. Thailand: Subregional Office for East Asia, International Labour Organization.

Siow J (2001). Casemix in Singapore – A Clinician's Perspective. *Annals Academy of Medicine Singapore*. 30(4)(Suppl): 1–2.

Taiwan (China) Ministry of Health and Welfare (2012). *Health Statistics in Taiwan (China) 2010: Part IV. National Health Expenditure*. Taipei City, Taiwan (China).

Tangcharoensathien V, Patcharanarumol W, Prakongsai P et al. (2010). Thailand health financing review, 2010. *Phusit and Jongudomsuk, Pongpisut and Srithamrongsawat, Samrit and Thammathataree, Jadej, Thailand Health Financing Review*.

Wagstaff A (2007). Health systems in East Asia: what can developing countries learn from Japan and the Asian Tigers? *Health Economics*. 16(5): 441–56.

Wu JJ (2015). Implementation and outcome of Taiwan (China) Diagnosis-Related Group (DRG) payment system. PhD thesis, Georgia State University.

Yang M (2011). Claims filing, reviewing and monitoring of DRGs-based payment system in Taiwan (China). Paper presented to the DRGs Symposium, Seoul, Korea.

Chapter 4. Assessing the impact of case-based payment

Yuki Murakami and Luca Lorenzoni²



Key points

- Improving efficiency and achieving higher quality are the motivations behind introducing DRG-based hospital payment.
- Evidence regarding the impact of DRG-based payment systems on efficiency and quality is limited and mixed.
- Substantial cross-country variations exist in the design, implementation and development of a DRG-based payment system. There is also heterogeneity among countries in terms of governance structures, and different starting points lead to different results.
- A number of key factors that could help achieve the objectives have been identified – a high degree of hospital autonomy, an adequate hospital information systems, the availability of supplementary regulatory mechanisms and a positive political and economic environment.
- There are common themes that emerge from the review of studies assessing the impact of DRG-based hospital payment systems:
 - Length of stay tends to decrease, in particular during the initial period following the introduction of a DRG system.
 - Volume of hospitalizations tends to increase in countries that use DRGs to set hospital budgets, while it tends to decrease in countries that shifted from a cost-based reimbursement system to a DRG-based payment.
 - When used to fund hospital services on a case-by-case basis, DRGs may also impact in an indirect way upon the non-hospital sector, as cost-shifting from inpatient to outpatient and patient-shifting to long-term or home care may take place.
- Incorporating adjustments for quality into pricing mechanisms appears to be particularly promising in influencing hospital behaviour.

2 *Disclaimer:* The opinion expressed and arguments employed herein are solely those of the authors and do not necessarily reflect the official views of the OECD or of its member countries.

The theory

Intended and unintended incentives of the DRG-based hospital payment model

The overall effects of the DRG-based model depend on how hospitals react to the different types of financial incentives induced by the model. Different strategic actions might be anticipated as hospital providers seek to increase efficiency and achieve cost containment under a DRG-based payment system. Hospital providers commonly aim to reduce their per-patient costs, the LOS in hospital, and the volume and intensity of health-care services provided within the scope of existing levels of activity. Since the revenue-per-patient in each DRG is fixed, this impacts on the overall allocation of financial resources to the hospital. Providers are, therefore, highly incentivized to deliver the most cost-effective services with reduced LOS in order to make the total cost lower than the payment per case and, as a result, maximize their revenue (Street et al., 2011). This particular payment mechanism encourages hospitals to find ways to cut costs and reduce inefficient and/or unnecessary practices in care provision and management.

Changes in resource consumption patterns, such as shortening the LOS and reducing the total resource input per case, are well known examples of behavioural change by providers. In addition to modifications in care provision, providers may also be forced to look into efficiency gains or cost savings through a review of management and the organization of services. Some of the measures taken include the scheduling of appointments, operations and discharges, procurement processes, and task-shifting among health professionals (Miraldo et al., 2006). Marginal, average and maximum cost data can help identify areas where cost increases or reductions can be achieved due to the implementation of such payment mechanisms. All of these examples encourage the development of new, cost-effective treatment pathways that can help keep costs under control.

In addition to the actions associated with seeking efficiency and cost containment, another effect of the widespread introduction of DRGs is the standardization of the multitude of different procedures and services across hospitals, as well as the placing of a large number of patients into clinically harmonized groups, each with a corresponding price established (Busse et

al., 2013). This new allocation of financial resources, in theory, encourages providers to compete with one another in terms of service performance and quality (Miraldo et al., 2006). Such competition can enhance patient choice and encourage providers to be responsive to patient needs and deliver integrated care services. Additionally, prices can be used as a policy instrument to signal what the health system should be doing and to sharpen incentives (Yip et al., 2004) so that good practice is rewarded and emulated. The shift from a capitation payment system to a DRG-based payment system also facilitates an increase in fairness and transparency, and provides an incentive for hospitals to develop robust patient-level costing systems, so as to improve cost consciousness (Lee & Lim, 2008).

However, it is also important to monitor for unintended consequences, as such a system may also lead to perverse incentives triggered by asymmetric information, where providers have more information about the profiles of care and costs than payers and patients. Problems include adverse selection, moral hazard and principal agent issues. In the absence of budget or volume ceilings, or control mechanisms in place for the DRGs, these problems can lead to “unintended consequences” as the DRG payment system *per se* regulates only prices, not quantities (Donaldson & Magnussen, 1991).

For example, with the introduction of DRGs, hospitals have pervasive incentives to up-code or reclassify cases into more intensive and expensive treatments so they can receive a higher payment. This phenomenon has been qualified as “DRG creep” (Hsia et al., 1992; Simborg, 1981). These perverse incentives can take different forms, as detailed below.

- **Unnecessary admissions and practices:** If specialized care and inpatient treatment have higher tariffs, providers may refer patients to such care or settings as a way to optimize revenues. This may lead to an increase in the number of admissions and/or use of diagnostic services that are, in fact, unnecessary if operating under a different payment mechanism. Unbundling is another practice to increase revenues, whereby providers submit individual bills for separate tests and procedures, which should normally be bundled together into a single classification.

- Over-concentration of services and under-provision: Strong incentives can exist for providers to identify certain services where the revenues may be highest and/or the difference between the operational costs and payments are greatest, such that they shift their activities in order to concentrate on these particular areas of practice. On the contrary, if the payment tariff is set too low for specific services, this can provide a negative incentive for providers to under-provide and turn away patients with such cases. Such areas may not be attractive enough for providers to increase the volume, even if the demand is great and there is a shortage in the volume provided.
- Early discharge and planned readmission: Because payments including hospitalization are pre-fixed for the treatment of each case, providers may be encouraged to plan an early discharge and readmission to maximize the payment. Such early discharges can pose a potential risk to patients, because they may leave hospital without achieving a full recovery.
- Selection of low-cost/low-risk patients and rejection of high-cost/high-risk patients: Payments made under "payment by results" systems imply that treating difficult and expensive patients will not give any financial incentives for providers (Miraldo et al., 2006; Sussex & Street, 2004). Deliberate attempts can be made by providers to attract patients with low severity and reject those with high severity.

Furthermore, providers may prefer to admit patients with conditions that do not require prolonged inpatient care, or whose treatment might be more treatable in the short term, compared to those with other diseases or cases requiring longer treatments. Mental illnesses are examples of such cases requiring prolonged care, unless there has been a policy shift whereby such services (i.e. community care) might be available elsewhere.

To reduce the negative consequences of asymmetric information, control mechanisms can be established to prevent providers from acting in the aforementioned manner. Monitoring mechanisms, such as auditing, can be put in place to check and detect incorrect coding and reporting practices. For example, expenditure ceilings can help discourage providers from

pursuing perverse incentives. The use of DRGs within a prospective global budgeting system also has the potential to act as a control mechanism by preventing providers from operating beyond the set ceiling. Non-payment of DRGs or financial penalties for readmitting patients within a certain timeframe is another way of controlling frequent and planned readmissions. Finally, providers can be discouraged from up-coding if DRG weights and factors are recalculated on a regular basis.

Context

Contextual factors for the successful introduction and implementation of DRGs

A number of key contextual factors can help achieve the objectives sought through the introduction and implementation of a DRG-based payment system.

- The degree of hospital autonomy in decisions regarding resource allocation and management in relation to financial incentives is a key success factor in any DRG-based payment system. The higher the degree of hospital autonomy in management and financial responsibility, the better informed and faster the decision-making process. This also means that a prerequisite for a DRG-based hospital payment system to work effectively is that purchasers and providers are separate entities (Busse & Quentin, 2011).
- The design and strength of hospital information systems must be adequate to describe, track and monitor changes in the volume and type of services provided (Jian et al., 2014). Conversely, the availability of DRG cost estimates is not a prerequisite for the introduction of a DRG-based payment system. Several countries have adjusted to the local context DRG weights imported from other countries to set prices when phasing in the system (Busse & Quentin, 2011). Building administrative capacity for the introduction of DRGs is necessary (Appleby et al., 2012), as well as creating robust information systems together with a flexible and transparent management and governance structure.

- To be effective, DRG-based payment systems should be supplemented by regulatory mechanisms, such as activity ceilings, marginal pricing, data audit, monitoring of the care process, and measurement of patient satisfaction and health outcomes.
- It is essential to recognize the importance of country-specific objectives, starting points, and related policies being implemented at the same time, as well as the context in which the hospital payment reforms are being implemented (Street et al., 2011). Experiences in one country do not necessarily predict those in another (Anderson, 2009), as choices are context-specific and dependent on which objectives are most desired, in addition to the political and economic situation.
- The political and economic environment is important. In particular, the perspectives of policy-makers on the type and degree of health-system deficits, the cross-national diffusion of ideas, and a positive economic environment that facilitates investments are all factors that can aid the successful introduction and implementation of a DRG-based payment system (D'ainno et al., 2008; Schmid et al., 2010).
- The purpose and objective for introducing DRGs and their place in health-care financing reform need to be clear. In particular, planners should keep in mind that the payment system regulates only prices, not quantities.

Evidence

Impact of DRG-based hospital payment systems on hospital efficiency and quality

DRGs can be used in two ways: as a method of funding care on a case-by-case basis, as in the Medicare programme in the USA, or as a method of establishing casemix adjusted hospital budgets, as in Victoria (Australia) and a number of European countries.

Results on the impact of DRG-based payment systems on hospital efficiency and quality are mainly available from the USA and European countries,

with some studies from Australia, Japan and the Republic of Korea. Evidence on the effects of DRGs on overall expenditure at system level is more difficult to ascertain (Stabile & Thomson, 2014). A systematic review of the worldwide evidence produced since 1980 found a very limited number of studies providing robust analysis of quantitative data (Palmer et al., 2014). The evidence suggests that changing to a DRG-based payment system shortens the LOS, while there is very little conclusive evidence regarding its impact on quality of care.

Table 8 summarizes the findings on the impact of the introduction of DRG-based payment systems on hospital costs, activity and quality of care.

Table 8: Impact of DRG-based payment systems on hospital costs, activity and quality of care

Indicator	Result	Country	Reference
LOS	Shorter length of stay	USA, Victoria (Australia), Central and Eastern Europe, Central Asian countries, Austria, Denmark, Germany, Italy, Norway, Spain and Sweden, Japan, China (*)	Reinhardt, 1996; Duckett, 1995; Moreno-Serra and Wagstaff, 2010; Street et al., 2007; Busse et al., 2013; Louis et al. 2008; Anderson and Ikegami, 2011; Nawata and Kawabuchi, 2011; Okumura et al., 2005; Zhang, 2010.
Cost	Decreased cost per discharge, reduction in unit cost	Central and Eastern Europe, Central Asian countries, Austria, Denmark, Germany, Italy, Norway, Spain and Sweden, Korea	Bae, 2012; OECD, 2012, Kwon, 2012, Lee and Lee, 2007; Moreno-Serra and Wagstaff, 2010; Forgiione, et al. 2005; Street et al. 2007; Busse et al. 2013; Louis et al. 2008
Quality	Increased appropriateness of hospital use	Italy	Louis, et al. 2008
Post-acute and outpatient care use	Faster shift from inpatient to outpatient care	Central and Eastern Europe, Central Asian countries, OECD	Moreno-Serra and Wagstaff, 2010; Forgiione, et al. 2005
Quality	No adverse effect	USA, Victoria (Australia)	Reinhardt, 1996; Guterman et al., 1988; Feinglass & Holloway, 1991; Lave, 1989; Russel, 1989; Duckett, 1995

Table 8: Impact of DRG-based payment systems on hospital costs, activity and quality of care (cont.)

Indicator	Result	Country	Reference
Discharge	Decreased discharge rate	USA, Victoria (Australia)	Reinhardt, 1996; Guterman et al., 1988; Feinglass & Holloway, 1991; Lave, 1989; Russel, 1989; Duckett, 1995
Quality	Planned readmission increased	Japan	Anderson and Ikegami, 2011; Nawata and Kawabuchi, 2011; Kuwabara & Fushimi, 2009; Okamura et al. 2005
Cost	Hospital expenditure decreased initially, controlling inpatient costs and pharmaceutical costs	China, Thailand, USA	Cutler 1995; World Bank, 2010; Yip et al, 2010; Zhang, 2010; Health Insurance System Research Office, 2012
Quality	Concentration of activities in the areas that present the highest margin.	USA	Keeler, et al. 1990; Kahn, et al. 1990; Steinwald and Dummit, 1989; Feinglass & Holloway, 1991; Hayes et al, 2007; Ginsburg & Grossman, 2005; Ginsburg, 2006
(*) : one hospital in Shanghai			

Source: Author's Summary

Studies assessing the impact of the introduction of DRG-based hospital payments through Medicare in the USA found evidence that it reduced LOS (Reinhardt, 1996), decreased the hospital discharge rate, and increased the use of post-acute and outpatient care (Guterman et al., 1988; Feinglass & Holloway, 1991), without having an adverse impact on quality of care (Lave, 1989; Russell, 1989). Two main factors were associated with the reduction in LOS: the increase in the efficiency of support/ancillary services production that contributed to an increase in the intensity of care per day; and an earlier discharge of patients to post-acute care settings through the diffusion of discharge planning and case-management programmes.

A RAND study using a representative sample of hospitalizations showed that, following the introduction of DRGs, the probability of a patient

being discharged in an instable state while in hospital increased, 30-day mortality following hospitalization decreased, and 180-day mortality remained unchanged (Rogers et al., 1990). Cutler (1995), using longitudinal data, showed that for hospitals that saw their income decrease because of DRGs, readmission rates and in-hospital mortality increased, without changes in the severity of the cases admitted. Shen (2003) showed that economic pressure linked to DRGs had a negative effect on the short-term clinical outcome for acute myocardial infarction cases, but that the one-year survival rate was not affected.

Studies also showed that the severity of admitted cases increased after the introduction of DRGs (Keeler et al., 1990; Kahn et al., 1990), and that part of this trend could be explained by different reporting practices (Steinwald & Dummit, 1989), in particular for comorbidities (Feinglass & Holloway, 1991). Total hospital costs were found to be stable after the introduction of DRGs, as the reduction in costs of inpatient care was compensated by an increase in the volume and complexity of hospital-based outpatient care, for which the payment was still based on “reasonable” costs. More recent studies provide evidence that increases in activity may occur in areas that present the highest margin (Hayes et al., 2007; Ginsburg & Grossman, 2005; Ginsburg, 2006).

In Victoria (Australia) – an early adopter of DRGs – the introduction was associated with shorter LOS, though this result was confounded by increased total spending to stimulate clinical activity in order to improve access to care (Duckett, 1995). More recent work has showed mixed efficiency effects (Ettelt et al., 2006).

In a review of countries in central and eastern Europe and central Asia, Moreno-Serra and Wagstaff (2010) confirmed that the introduction of DRGs was associated with shorter LOS and decreasing costs per discharge. However, they also found an increase in total hospital spending due to increasing volumes of patients treated. Observations from 30 OECD countries also provided evidence that hospitals paid on a DRG basis shifted from inpatient to outpatient care faster than those that were not funded on the basis of activity (Forgione et al., 2005).

In Europe, where DRGs are used in setting part or all of the hospital budget, evaluations have found that activity increased following reform in Austria, Denmark, Germany, Italy, Norway, Spain and Sweden. In addition, in some (but not all) of these countries, payment reform contributed to a reduction in LOS, an increase in technical productivity, and a reduction in unit costs or waiting times (Street et al., 2007; Busse et al., 2013). In France, results showed that public hospitals increased activity and productivity, in particular for surgical cases, following the introduction of a DRG-based payment system. For private hospitals, an increase in day surgery and ambulatory surgery cases was observed, while a decrease in the number of medical and obstetric inpatient cases was reported (Or et al., 2013).

DRG-based payment also created challenges in controlling volumes and ensuring appropriateness of care (Or, 2014). Farrar (2009) concluded that the introduction of DRG-based payment in England appeared to have led to a more rapid reduction in LOS and a quicker increase in the proportion of day cases than in Scotland (control group). No results supported the proposition that quality of care – measured by in-hospital mortality 30-days post-surgical mortality, emergency readmission after treatment for hip fracture – had suffered as a result of the introduction of a DRG-based payment system. In Italy, a decline in ALOS and a greater severity of illness among hospitalized patients was reported, while little or no change in mortality and readmission rates was observed (Louis et al., 1999). In one Italian region, observed trends showed increasing appropriateness of hospital use, largely due to the implementation of reforms to reduce bed stocks and decrease tariffs for selected DRGs seen as to be at high risk of inappropriate hospitalization (Louis et al., 2008).

In Japan, payments through the DPC system are set on a per diem basis. Surgical operations, endoscopic examinations, rehabilitation therapy, devices and drugs given on the day of surgical operation are not included in the DPC payment, but paid on a FFS basis. The introduction of the DPC in April 2003 was associated with a decline in ALOS among hospitals opting to be paid by DPC (Anderson & Ikegami, 2011), particularly those hospitals with a long ALOS (Nawata & Kawabuchi, 2011). The DPC's effects on total charges and outcome of hospital care were mixed. A reduced resource use, as measured by total accumulated charges for acute myocardial infarction

cases, was reported, while no improvement was observed in quality of care (Hamada et al., 2012). For hip fracture, the percentage of patients in worse condition at discharge was higher when DPC was used, while the opposite was reported for cases of lung cancer. Inpatient mortality and readmission rates did not change for either diagnosis (Kondo & Kawabuchi, 2012). For breast cancer cases treated by either surgery or chemotherapy, hospitals responded to the new payment system incentives by controlling costs while maintaining quality of care (Kuwabara & Fushimi, 2009). Earlier work reported a decrease in ALOS, as well as an increase in planned readmission, so that no change was observed in total inpatient expenditures (Okamura et al., 2005).

In China, there are some preliminary results from a few experiments aimed at introducing a hospital case-based payment system at local level (World Bank, 2010; Yip et al., 2010). At Jining Medical College Hospital, expenditures on the diseases covered by case-based payments decreased by one third; the main contributor to this change was a reduction in drug expenditure. To assess the impact of payment reform through the National Cooperative Medical System (NCMS) in Qianjiang, acute appendicitis was used as a tracer. Expenditure per case of appendicitis decreased in both township and county hospitals, mainly attributable to decreased drug expenditures. In Zheng'an, the NCMS case-based payment system reduced costs, while expenditures on diseases not covered by the system increased. Zhang (2010) reported a decrease in ALOS and a shift of costs to uninsured patients in one hospital in Shanghai after the introduction of DRG-based payments. Those results confirm that if too few diseases are covered under a case-based payment system, the overall effect on cost containment may be limited. However, a rigorous and objective assessment is needed before conclusions can be drawn about the impact of using case-based payment systems in China.

The Republic of Korea introduced a DRG-based payment for seven surgical categories (for a total of 61 DRGs) in 2002. Hospital participation was on a voluntary basis. In fact, tertiary care hospitals and most general hospitals did not participate in the scheme, opting to keep the FFS payment (Bae, 2012; OECD, 2012). As a result, only 10% of cases and expenditure were covered under the DRG scheme. A reduction of costs in participating

hospitals was reported, with no negative effect on complication and re-operation (Kwon, 2012). According to Lee and Lee (2007), the introduction of DRGs did not encourage providers to alter their medical practice for caesarean section procedures.

In Thailand, the use of DRGs to reimburse hospitals up to a capped regional global budget has proven to be an effective tool in controlling for inpatient expenditure (Health Insurance System Research Office, 2012).

Incorporating quality into DRG-based payments

Many countries are experimenting with new methods to realign payment incentives in health care to encourage higher quality and more efficient care, often known as “P4P” (Epstein, 2007; OECD, 2009). These P4P schemes are testing whether new ways of paying providers (i.e. hospitals, primary care, integrated systems), which include a synthetic measure of quality, show improvements in the quality of care and value for money in health. Specific P4P premiums or withholds may be an important tool to influence provider behaviour (Charlesworth et al., 2012). P4P programmes have been widely introduced across OECD countries, yet research designs that aim to evaluate them are often inadequate to provide clear answers about their impact on quality and costs (Rosenthal et al., 2006; Petersen et al., 2006). Nevertheless, even with limited evaluation in OECD countries, the initial results of P4P programmes have galvanized payers and providers to measure health-care quality (Rebhun et al., 2009).

A growing body of evaluation casts doubt on the extent to which providers respond to the specific structure of economic incentives in P4P programmes. Recent evaluations of the USA Medicare Premier Hospital Quality Incentive Demonstration found little evidence that hospital participation in a P4P programme leads to improved outcomes (Werner et al., 2011; Jha et al., 2012). Several factors affected hospital responses to P4P, and the effect varied according to incentive size, amount of competition, and hospital finances. Moreover, hospitals with low initial performance on quality measures showed no response to incentives to improve (Ryan et al., 2012). There is also evidence of the ineffectiveness of a non-voluntary P4P programme in Massachusetts (Ryan et al., 2011).

Given the mixed experience, potential limitations and unexpected consequences of existing P4P programmes (Epstein, 2006), a number of recommendations have been made for their future development. A checklist to help prevent premature or inappropriate implementation of P4P programmes was devised (Glasziou et al., 2012). Cromwell (2011) identified a set of requirements for so-called “second generation” P4P initiatives. A central theme was the importance of integrated health care and the need for P4P programmes to support integration. This includes directing payments towards large provider organizations rather than individual physicians (to encourage team-based care) and making providers more accountable for reducing fragmentation in health care (e.g. requiring one provider organization to take responsibility for a patient’s complete care). Other recommendations for second-generation P4P programmes include increasing the size of both financial risks and rewards; setting more ambitious quality improvement goals with exception reporting (Kontopantelis et al., 2012); using electronic health record systems to implement patient-specific quality targets; involving providers in the programme design (Kirschener et al., 2012); and ensuring that incentives of any type are as closely aligned to professional values as possible.

Though the evidence is still insufficient to draw definitive conclusions, incorporating adjustments for quality into pricing mechanisms appears to be particularly promising in influencing hospital behaviour.

Non-payment for non-performance in hospitals

There are several options within the general framework of “non-payment for non-performance” in hospitals. These can be arrayed along a spectrum of increasing scope of potential complications (Health Policy Solutions, 2011). The narrowest scope includes complications that are clearly preventable and should never occur (“never events”), wrong-site surgery being the best example. Some routine hospital data sets used for ABF distinguish pre-existing comorbidities present on admission and hospital-acquired complications. The USA Medicare payment system has recently been modified to exclude a limited list of hospital-acquired conditions from being used in assigning cases in the casemix classification, and thus from impacting activity-based payment (Averill et al., 2011; McNair et al., 2012).

The polar opposite of a narrow scope is to identify all hospital-acquired conditions or readmissions as within scope.

The softest form of payment impact is simply to exclude consideration of hospital-acquired complications from consideration in DRG assignment. By removing not-present-on-admission diagnoses from DRG assignment, weights are assigned purely on the basis of pre-existing risks, with the costs of complications still contributing to the estimation of relative weights, but not influencing the DRG into which patient episodes are assigned. The USA Medicare programme has adopted this softer payment impact approach for 11 hospital-acquired conditions. The toughest payment impact is to apply penalties for rates of poor performance. Since the 2013 fiscal year, the USA Medicare programme has imposed penalties on hospitals (1% of payments in the 2013 fiscal year, and up to 3% in the 2015 fiscal year) for excess rates of readmission for acute myocardial infarction, heart failure and pneumonia.

Discussion

Evidence regarding the impact of DRG-based payment systems on efficiency and quality is limited and mixed, and it is difficult to draw unequivocal conclusions about the links between DRG-based payment systems and hospital performance (Sutherland, 2011; O'Reilly et al., 2012). As there is a shortage of formal evaluations and study samples are often limited to one or few hospitals and selected conditions, the generalizability of findings may be limited. Most studies are one-off evaluations made during the two to three years following implementation, and may be unlikely to detect changes if reforms have been phased in over a number of years. Studies with longer timeframes, on the other hand, may be subject to potential confounding factors, due to the introduction of other policies during the study period.

Furthermore, substantial cross-country variations exist in the design, implementation and development of a DRG-based payment system. There is also heterogeneity among countries in terms of governance structures, and different starting points lead to different results.

Nevertheless, there are common themes that emerge from the review of studies examining the implementation of DRG-based hospital payment systems.

- LOS tends to decrease, in particular during the initial period following the introduction of a DRG system.
- Volume of hospitalizations tends to increase in countries that use DRGs to set hospital budgets, while it tends to decrease in countries that shifted from a cost-based reimbursement system to a DRG-based payment.
- Evidence regarding technical efficiency (cost per admission) is mixed.
- When used to fund hospital services on a case-by-case basis, DRGs may also impact in an indirect way upon the non-hospital sector, as cost-shifting from inpatient to outpatient and patient-shifting to long-term or home care may take place.
- Evidence regarding the impact on quality is very limited. However, no associated change in quality or detrimental impact on quality of care was observed.

The increasing use of DRG-based payments to hospitals should serve as a financial incentive to reduce costs per patient and ALOS, thus improving technical efficiency. Our review, however, found little evidence that the DRG technology has been effective in reaching this goal.

References

- Anderson G (2009). The effects of payment by results. *British Medical Journal*. 339.
- Anderson G, Ikegami N (2011). How can Japan's DPC inpatient hospital payment system be strengthened? *Lessons from the US Medicare Prospective System. A Report of the CSIS Global Health Policy Center, Washington, DC*.
- Appleby J, Harrison T, Hawkins L et al. (2012). *Payment by Results: How Can Payment Systems Help to Deliver Better Care?* The King's Fund.
- Averill RF, Hughes JS, Goldfield NI (2011). Paying for outcomes, not performance: lessons from the Medicare inpatient prospective payment system. *Joint Commission Journal on Quality and Patient Safety*. 37(4): 184–192.
- Bae K (2012). 10-year experience of DRG payment in Korea. Presentation at the International symposium on DRG-based payment organized by the Health Insurance and Review and Assessment Service, Seoul.
- Busse R, Geissler A, Aaviksoo A et al. (2013). *Diagnosis Related Groups in Europe: moving towards transparency, efficiency, and quality in hospitals*. 346.
- Busse R, Quentin W (2011). Moving towards transparency, efficiency and quality in hospitals conclusions and recommendations. *Diagnosis-Related Groups in Europe: moving towards transparency, efficiency and quality in hospitals*. Maidenhead: Open University Press. 149–71.
- Charlesworth A, Davies A, Dixon J (2012). *Reforming payment for health care in Europe to achieve better value*. Nuffield Trust Research Report (http://www.nuffieldtrust.org.uk/sites/files/nuffield/publication/120823_reforming-payment-for-health-care-in-europev2.pdf, accessed 30 January 2015).
- Cromwell J, Trisolini M, Pope G et al. editors (2011). *Pay for Performance in Health Care: Methods and Approaches*. New York: RTI Press.
- Cutler DM (1993). *The incidence of adverse medical outcomes under prospective payments*. National Bureau of Economic Research.

D'Aunno T, Kimberly JR, de Pouvourville G (2008). Conclusions: The global diffusion of casemix. *The Globalization of Managerial Innovation in Health Care*. Cambridge University Press.

Donaldson C, Magnussen J (1991). DRGs: the road to hospital efficiency? *Health Economics Research Unit Discussion Paper 09/91*. University of Aberdeen.

Duckett SJ (1995). Hospital payment arrangements to encourage efficiency: the case of Victoria, Australia. *Health Policy*. 34(2): 113–34.

Duckett SJ (1998). Casemix funding for acute hospital inpatient services in Australia. *The Medical Journal of Australia*. 169: S17–21.

Epstein AM (2006). Paying for performance in the United States and abroad. *The New England Journal of Medicine*. 355(4): 406–408.

Epstein AM (2007). Pay for performance at the tipping point. *The New England Journal of Medicine*. 356(5): 515–517.

Ettelt S, Thomson S, Nolte E et al. (2006). *Reimbursing highly specialised hospital services: the experience of activity-based funding in eight countries*. London School of Hygiene and Tropical Medicine.

Farrar S, Yi D, Sutton M et al. (2009). *Has payment by results affected the way that English hospitals provide care? Difference-in-differences analysis*. 339.

Feinglass J, Holloway JJ (1991). The initial impact of the Medicare prospective payment system on US health care: a review of the literature. *Medical Care Research and Review*. 48(1): 91–115.

Forgione DA, Vermeer TE, Surysekar K et al. (2005). DRGs, costs and quality of care: an agency theory perspective. *Financial Accountability & Management*. 21(3): 291–308.

Ginsburg PB (2006). Recalibrating Medicare payments for inpatient care. *The New England Journal of Medicine*. 355(20): 2061.

Ginsburg PB, Grossman JM (2005). When the price isn't right: how inadvertent payment incentives drive medical care. *Health Affairs*. 24(5): 1382.

Glasziou PP, Buchan H, Del Mar C et al. (2012). When financial incentives do more good than harm: a checklist. *British Medical Journal*. 345: e5047.

Guterman S, Eggers PW, Riley G et al. (1987). The first 3 years of Medicare prospective payment: an overview. *Health Care Financing Review*. 9(3): 67–77.

Hamada H, Sekimoto M, Imanaka Y (2012). Effects of the per diem prospective payment system with DRG-like grouping system (DPC/PDPS) on resource usage and healthcare quality in Japan. *Health Policy*. 107(2): 194–201.

Hayes KJ, Pettengill J, Stensland J (2007). Getting the price right: Medicare payment rates for cardiovascular services. *Health Affairs*. 26(1): 124–36.

Health Insurance System Research Office (2012). Thailand's Universal Coverage Scheme: Achievements and Challenges. An independent assessment of the first 10 years (2001–2010). Nonthaburi, Thailand.

Health Policy Solutions (2011). Literature review: efficiency, international best practice in ABF and future payment reform (in association with Casemix Consulting and Aspex Consulting).

Hsia DC, Ahern CA, Ritchie BP et al. (1992). Medicare reimbursement accuracy under the prospective payment system, 1985 to 1988. *Journal of the American Medical Association*. 264(15): 1984–88.

Jha AK, Joynt KE, Orav EJ et al. (2012). The long-term effect of premier pay for performance on patient outcomes. *The New England Journal of Medicine*. 366: 1606–1615.

Jian W, Lu M, Han W et al. (2014). Introducing diagnosis-related groups: is the information system ready? *The International Journal of Health Planning and Management*.

Kahn KL, Rubenstein LV, Draper D et al. (1990). The effects of the DRG-based prospective payment system on quality of care for hospitalized Medicare patients: an introduction to the series. *The Journal of the American Medical Association*. 264(15): 1953–5.

Keeler EB (1990). What proportion of hospital cost differences is justifiable? *Journal of Health Economics*. 9(3): 359–65.

Kirschner K, Braspenning J, Akkermans RP et al. (2012). Assessment of a pay-for-performance program in primary care designed by target users. *Family Practice*. 30(2): 161–71.

Kondo A, Kawabuchi K (2012). Evaluation of the introduction of a diagnosis procedure combination system for patient outcome and hospitalisation charges for patients with hip fracture or lung cancer in Japan. *Health Policy*. 107(2): 184–93.

Kontopantelis E, Doran T, Gravelle H et al. (2012). Family doctor responses to changes in incentives for influenza immunization under the U.K. quality and outcomes framework Pay-for-Performance scheme. *Health Services Research*. 47(3): 1117–1136.

Kuwabara H, Fushimi K (2009). The impact of a new payment system with case-mix measurement on hospital practices for breast cancer patients in Japan. *Health Policy*. 92(1): 65–72.

Kwon S (2012). DRG-based payment system in Korea: key issues and challenges. Presentation at the International symposium on DRG-based payment organized by the Health Insurance and Review and Assessment Service, Seoul.

Lave JR (1989). The effect of the Medicare prospective payment system. *Annual Review of Public Health*. 10(1): 141–61.

Lee K, Lee S (2007). Effects of the DRG-based prospective payment system operated by the voluntarily participating providers on the cesarean section rates in Korea. *Health Policy*. 81(2): 300–8.

Lee CE, Lim EK (2008). Casemix in Singapore. In: de Pouvourville G, D'Aunno T, editors. *The Globalisation of Managerial Innovation in Healthcare*. Cambridge University Press.

Liang LH (2015). Do DRG-based payments incentivise hospitals to adjust output mix? *Health Economics*. 24(4): 454–469.

Louis D, Taroni F, Melotti R et al. (2008). Increasing appropriateness of hospital admissions in the Emilia-Romagna region of Italy. *Journal of Health Services Research and Policy*. 13(4): 202–208.

Louis DZ, Yuen EJ, Braga M et al. (1999). Impact of a DRG-based hospital financing system on quality and outcomes of care in Italy. *Health Services Research*. 34(1): 405–415.

McNair PD, Luft HS (2012). Enhancing Medicare's hospital-acquired conditions policy to encompass readmissions. *Medicare & Medicaid Research Review*. 2(2): E1–E14.

Moreno-Serra R, Wagstaff A (2010). System-wide impacts of hospital payment reforms: evidence from Central and Eastern Europe and Central Asia. *Journal of Health Economics*. 29(4): 585–602.

Nawata K, Kawabuchi K (2011). Evaluation of the DPC-based inclusive payment system in Japan for cataract operations. Paper presented at the 19th International Congress on Modelling and Simulation. Perth, Australia, 12–16 December 2011 (<http://www.mssanz.org.au/modsim2011/D2/nawata.pdf>)

OECD (2009). Achieving Better Value for Money in Health Care. OECD Health Policy Studies. OECD Publishing (<http://www.oecd.org/els/health-systems/achievingbettervalueformoneyinhealthcare.htm>, accessed 6 February 2015).

OECD (2012). OECD reviews of healthcare quality: Korea – raising standards. OECD Publishing (<http://dx.doi.org/10.1787/9789264173446-en>, accessed 6 February 2015).

O'Reilly J, Busse R, Häkkinen U et al. (2012). Paying for hospital care: the experience with implementing activity-based funding in five European countries. *Health Economics, Policy and Law*. 7(01): 73–101.

Okamura S, Kobayashi R, Sakamaki T (2005). Case-mix payment in Japanese medical care. *Health Policy*. 74(3): 282–6.

Or Z (2014). Implementation of DRG payment in France: issues and recent developments. *Health Policy*. 117(2): 146–50.

Or Z, Bonastre J, Journeau F et al. (2013). *Activité, productivité et qualité des soins des hôpitaux avant et après la T2A*.

Palmer KS, Agoritsas T, Martin D et al. (2014). Activity-based funding of hospitals and its impact on mortality, readmission, discharge destination, severity of illness, and volume of care: a systematic review and meta-analysis. *PloS One*. 9(10): e109975.

Petersen LA, Woodard LD, Urech T et al. (2006). Does pay-for-performance improve the quality of health care? *Annals of Internal Medicine*. 145: 265–272.

Rebhun D, Williams T (2009). The California Pay For Performance Programme: The Second Chapter Measurement Years 2006–2009. Oakland, California: Integrated Healthcare Association.

Reinhardt UE (1996). Spending more through 'cost control': our obsessive quest to gut the hospital. *Health Affairs (Project Hope)*. 15(2): 145.

Rogers WH, Draper D, Kahn KL et al. (1990). Quality of care before and after implementation of the DRG-based prospective payment system. A summary of effects. *The Journal of the American Medical Association*. 264(15): 1989–94.

Rosenthal MB, Frank RG (2006). What is the empirical basis for paying for quality in health care? *Medical Care Research & Review*. 63: 135–157.

Russell LB, Institution B (1989). Medicare's new hospital payment system: is it working? *Brookings Institution Washington, DC*.

Ryan AM, Blustein J (2011). The effects of the MassHealth pay for performance program on quality. *Health Services Research*. 46(3): 712–728.

Ryan AM, Blustein J, Casalino LP (2012). Medicare's flagship test of pay for performance did not spur more rapid quality improvement among low-performing hospitals. *Health Affairs*. 31(4): 797–805.

Schmid A, Cacace M, Götze R et al. (2010). Explaining health care system change: problem pressure and the emergence of “hybrid” health care systems. *Journal of Health Politics, Policy and Law*. 35(4): 455–86.

Shen YC (2003). The effect of financial pressure on the quality of care in hospitals. *Journal of Health Economics*. 22(2): 243–69.

Simborg DW (1981). DRG creep: a new hospital-acquired disease. *The New England Journal of Medicine*. 304(26): 1602–04.

Stabile M, Thomson S (2014). The changing role of government in financing health care: an international perspective. *Journal of Economic Literature*. 52(2): 480–518.

Steinwald B, Dummit LA (1989). Hospital case-mix change: sicker patients or DRG creep? *Health Affairs*. 8(2): 35–47.

Street A, O'Reilly J, Ward P et al. (2011). DRG-based hospital payment and efficiency: theory, evidence, and challenges. *Diagnosis-Related Groups in Europe: moving towards transparency, efficiency and quality in hospitals*. Maidenhead: Open University Press. 93–114.

Street A, Vitikainen K, Bjorvatn A et al. (2007). Introducing activity-based financing: a review of experience in Australia, Denmark, Norway and Sweden. *Centre for Health Economics, University of York, CHE Research Paper* 30.

Sutherland JM, CHSRF (2011). Hospital payment mechanisms: an overview and options for Canada. *Canadian Health Services Research Foundation*.

Werner RM, Kolstad JT, Stuart EA et al. (2011). The effect of pay for performance in hospitals: lessons for quality improvement. *Health Affairs*. 30(4): 690–698.

World Bank (2010). Health Provider Payment Reforms in China: What International Experience Tells Us. *China Health Policy Notes* 5.

Yip W, Eggleston K (2004). Addressing government and market failures with payment incentives: hospital reimbursement reform in Hainan, China. *Social Science & Medicine*. 58(2): 267–77.

Yip WCM, Hsiao W, Meng Q et al. (2010). Realignment of incentives for health-care providers in China. *The Lancet*. 375(9720): 1120–30.

Zhang J (2010). The impact of a diagnosis-related group-based prospective payment experiment: the experience of Shanghai. *Applied Economics Letters*. 17(18): 1797–803.

Chapter 5: Conclusions and lessons for the region

John C. Langenbrunner



Key points

The social and cultural context of the Asia and Pacific region is changing, with ageing populations, upticks in noncommunicable diseases, greater access to insurance, and rising expectations from an emergent middle class. These factors are pushing up demand and expenditure for health-care services. New hospital payment systems are part of the response to improve transparency, technical efficiency, and equity and fairness of allocation across providers.

This chapter summarizes and concludes the review. It identifies 10 issues that serve as key questions and emergent “lessons” for countries considering a new approach to hospital payments.

1. **Make or buy?** Should a country develop its own casemix classification or adopt a classification developed elsewhere?
2. **How good is available coded clinical data on activity?** The quality of coding for patient records will shape the case-based payment system design.
3. **How well trained are the medical-record and facility-based coders?** A number of factors will affect the accuracy of coding, including the adequacy of documentation in clinical records, availability of skilled coding staff, and clear and consistent coding rules.
4. **How precise is the cost data?** Cost data are most valuable when captured at a granular level of detail, for example, the specific activities of each hospital department (typically referred to as patient-level costing).
5. **How capable and ready is the purchaser (i.e. health ministry or insurance fund), and also the provider?** The success of introducing case-based payments will, in part, be influenced by the implementation process, including stakeholder engagement. Mechanisms and capacity for this process are therefore important. In a similar vein, how autonomous is the provider?
6. **Should there be pricing adjustments beyond those incorporated in classification design?** These are generally for legitimate and unavoidable factors that influence the cost of

care, such as adjustments for poor patients, for teaching and research, and for input costs (e.g. labour costs) across urban and rural areas.

7. **Should volume be capped?** The region's higher income countries can be viewed as models in the design of volume caps. Activity caps automatically limit planned expenditure and, in this way, case-based payment arrangements give the same level of spending certainty provided by global budgets and line-item budgets. Allocation caps can also serve as a valuable planning tool.
8. **Should the case-based model be phased in and how?** Almost every country has chosen to phase in the case-based system using a number of approaches, including: by classification categories (Japan, the Philippines, the Republic of Korea and selected counties in China); by the nature of costs, i.e. salaries versus other types of costs (Thailand); and by participating hospitals (the Republic of Korea). This region is unique in that it has introduced at least one new phase-in approach: by disease category. Further evidence is needed to assess whether this approach can be manipulated by coding selectively, effectively cost-shifting from a fixed price to a FFS reimbursement category.
9. **Is there adequate monitoring and evaluation?** Every case-based payment reform has delivered surprises for purchasers and providers. Thus, a pro-active monitoring and evaluation strategy at the start of phase-in is necessary.
10. **Can payment and quality be linked? The next frontier?** Case-based activity payments initially paid for activity, implicitly assuming evenness of quality across providers. This volume showcases several countries that routinely monitor along multiple dimensions and are already linking payment and quality outcomes.

These new models are not costless; they require time and investment. Preconditions for success provide caution for countries considering moving to these new payment systems.

Context

In the introduction to this volume, it was noted that Busse et al. (2011) pose three questions to countries intending to introduce DRG-based systems: Is the political situation favourable to the introduction of the DRG system? Is the institutional and legal context adequate? And what is the intended purpose of using DRGs?

On the first and second questions, the Asia and Pacific region is extremely diverse, perhaps more so than other regions of the world. The region contains great variations in size and population, from small Pacific Islands with fewer than 100 000 people to countries such as China and Indonesia, the first and fourth biggest countries in the world respectively. Relative to other regions, it is the world's most populous. It contains the world's fastest growing economies and a wide spectrum of political and government organizations, from democracies to military dictatorships. While many of the countries are highly centralized, fiscal and political decentralization is an important pattern among many countries.

The recent history of the region presents a surprising profile of relatively good health outcomes, while simultaneously spending relatively little on health. The Asia and Pacific countries perform relatively well in regional comparisons of commonly used health and expenditure indicators. Outcomes on infant mortality, child mortality and life expectancy are favourable relative to levels of income and health spending.

Historically, the Asia and Pacific countries have spent less on health, both as a share of GDP and in per capita terms, relative to other countries at comparable levels of income. Levels of total and public (government) health spending are both low. The lower health spending is reflected in the lower levels of health system inputs, such as doctors, nurses and beds per capita population. Lower public spending further correlates with poor levels of financial protection in many countries, even in some of the high-income countries.

In terms of equity, in high-income countries where universal coverage has been achieved, inequalities still exist due to shallow coverage: the more catastrophic expenditures may be outside the domain of health insurance,

or there may be wide variation in benefit packages offered under different insurance schemes. Where the social insurance law mandates the same benefits for all (e.g. Japan), there are fewer inequities. Similarly, in high-income tax-financed countries and territories where universal coverage has been achieved (e.g. Hong Kong Special Administrative Region [SAR] of China and Malaysia), inequalities are not as widespread because there are fewer restrictions on who has access to which services.

Benefit-incidence studies in Asia have typically found that public health spending in low- and middle-income countries is not pro-poor. Public subsidies for inpatient care are especially pro-rich, although there are some exceptions. For example, the distribution of public subsidies for both hospital and non-hospital care is considerably more pro-poor in Hong Kong SAR, Malaysia, Sri Lanka and Thailand.

Growing demand

At the same time, many countries in the Asia and Pacific region are facing growing demand for health care, along several dimensions. Demand for care is expected to rise significantly over the next few years due to a combination of factors:

- a growing population in many countries;
- an ageing population, which is already occurring in Japan, the Republic of Korea and Singapore, and will significantly affect countries like China and Indonesia over the next decade;
- a changing disease profile, from infectious diseases like tuberculosis to noncommunicable diseases like diabetes, hypertension and cancers, which require ongoing management;
- a rising middle class in many countries, with higher expectations of high-quality care and more aggressive health-seeking behaviours; and
- the “insurance effect”, which may lead to rising demand for services in countries moving to UHC.

Greater demand for care may necessitate greater funding, but also improved management of funds and efficiency in allocation of services.

To date, many countries in the Asia and Pacific region have not managed utilization and costs in an optimal way.

Against this backdrop, there is a rich variety of provider payment systems in the Asia and Pacific region, and many countries would appear to be in transition. Historically, there has been an over-reliance on FFS. Outside of high-income countries, FFS is often utilized in conjunction with supply-side financing and line-item budgets, as in China, the Lao People's Democratic Republic (Lao PDR), the Philippines and Viet Nam. This can provide a toxic mix of incentives. On the one hand, line-item budgets are often unresponsive to patient needs and demands. The FFS overlay can encourage unnecessary demand, often as a way of generating new revenues for underfunded line-item budgets or reallocating revenues across line-item budgets. The impact can fall on the purchaser in terms of unnecessary outlays or the consumer as OOP costs.

At the same time, many countries are now looking to move beyond FFS, especially as they face issues related to increases in expenditure, and cost containment and efficiency become higher priorities. This volume has spotlighted several achievements. Australia first introduced case-based payments (often referred to as DRGs) in the 1990s; Japan and the Republic of Korea have more recently started to move beyond FFS payments. New provider payment strategies and pilots are emerging in several countries regardless of levels of per capita income (China, Indonesia, Mongolia and Viet Nam, for example). Thailand is perhaps the regional leader for middle-income countries moving beyond FFS, with a sophisticated mix of geographic caps, facility global budgets and casemix adjusters for hospital admissions.

Indeed, there is increasing policy interest in case-based payments as an approach to funding across several types of care. Major institutional providers, such as hospitals and nursing homes, as well as certain other health services (e.g. home care), are moving to have funding based on activity, with the capacity for their funding to vary up or down with changes in activity.

Policy purposes and objectives vary, as do design elements

Finally, the third question posed by Busse et al. (2011): what is the intended purpose of using DRGs? Case-based payments can serve a number of objectives:

- to improve transparency of hospital funding, by moving from negotiated bases of funding to funding based on a formula;
- to improve equity of funding between different hospitals (all hospitals funded on the same basis for the same activity); and/or
- to drive improvement in technical efficiency.

If well designed, case-based payments can also encourage allocative efficiency, by moving unnecessary care out of hospitals into more cost-effective settings.

The region has made enormous strides in the last two decades, with clear models of success and development in Australia, Japan, New Zealand, the Republic of Korea, Singapore and Thailand.

Policy objectives have varied, leading to different designs. Health-care systems transitioning from a budget system for hospitals have used case-based payments to improve transparency and equity in resource allocation, while FFS-based health systems have adopted case-based payments to contain costs and enhance efficiency. The Republic of Korea, for example, implemented case-based payments as a way to contain costs. Australia, New Zealand, Singapore and Thailand, on the other hand, have focused on improved funding mechanisms for reasons of equity, as well as greater transparency and better-targeted mechanisms for resource allocation. Japan's DPC/PDPS was established to deliver quality health care and to efficiently construct a clinical database by establishing a standardized information platform.

As discussed in Chapter 3, there are several steps common to most systems in the region. These include: the allocation of extremely high-cost cases to Pre-MDCs; the allocation of all cases to MDCs based on principal diagnosis; "operating room" cases separated into a "surgical" partition and other cases

into a “medical” partition; and other characteristics (e.g. age, complications, comorbidities) used to further subdivide partitions, in order to classify cases based on their resource consumption and create the final groups (i.e. DRGs).

The classification systems in Australia, Japan, the Republic of Korea and Thailand all started with the USA model from the 1980s, but each system underwent extensive modifications and are now distinctly different. While globally, the number of casemix categories has generally varied between 500 and 800, Japan and Thailand have both developed more extensive systems, with 2241 and 2450 categories respectively. Japan has blended per diem and FFS payments into its casemix classification system.

Costs are calculated in different ways. Japan and Thailand use charges to estimate costs given, so that each country has a history of FFS claims at its disposal. Japan collects data from 1000 hospitals. The Republic of Korea uses charges from claims as well as a hospital survey. Australia collects cost information from hospitals on a voluntary basis, but has a large sample of more than 370 public and private facilities.

In the Republic of Korea, evaluation and monitoring link payment and quality with 18 indicators; in Japan, it is linked with 10 indicators; in Australia for 6 categories of indicators, and in Singapore, with an indicator for readmissions. This collection of indicators is relatively advanced compared to European models of case-based payment. Australia relies more on uniform hospital outcome indicators, which are collected by a separate commission on safety and quality, but not explicitly linked to hospital payment.

Implementation strategies have also varied. In a move unique to this part of the world, many countries have phased in case-based payments by disease categories. In the Republic of Korea, seven disease categories were implemented for private facilities, while an almost exhaustive DRG system with 550 categories was implemented for public facilities. Other phase-in strategies include Singapore, which modified the Australian grouper and began with public hospitals only. Japan phased in its system by scaling up to include higher numbers of hospitals over time. Thailand implemented

its DRG system as part of its LIC scheme, and later its Universal Coverage Scheme. This served as a wedge to phase in DRGs across richer schemes for civil servants and the formal sector. Finally, Australia utilized a geographic phase-in for DRGs beginning in the state of Victoria.

Processes and the capacity for stakeholder engagement are both important for the success of DRG-based payment systems. Negotiation is a formal part of the rate-setting process in Japan and New Zealand. Australia has set up an independent board to review and update its DRG system. Private providers paid by FFS are usually opposed to DRG-based payment, and this region has proved no exception.

Lessons for other countries

Volume 2 will look at other countries in the Asia and Pacific region, and how they are moving to new case-based approaches to payment. But where should these countries start? And how quickly can, and should, they adopt this new approach to payment? Case-based payments are complex for purchasers and providers. There are multiple issues with case-based payment design. Importantly, implementation of case-based payments will be different for every country, as adaptations are made for the country's institutional structure, the weight given to different policy objectives, and the capacity for health policy development and implementation. Several questions need to be answered by policy-makers considering this new approach. At least 10 issues in the design and implementation of a new case-based payment system have emerged from this volume. Policy-makers are wise to step through each of these issues, as outlined below.

1. **Make or buy?** Should a country develop its own casemix classification or adopt a classification developed elsewhere? Japan and the Republic of Korea have opted for locally developed classifications. However, the cost of developing (and maintaining) a local system is high and could require a long lead-time. It also typically requires more data than adapting an existing system. On the other hand, Indonesia purchased its case-based system from a university vendor to address the President's time constraints, only to face a crisis in perceived fairness and precision under its new single-payer

insurance system. Adopted systems may require licensing costs upfront, and on an ongoing basis. They also require adequate modifications to reflect local cost structures and clinical practice patterns. Singapore is a good model in this respect. Finally, could smaller countries in the region, such as Cambodia and the Lao PDR, work with nearby countries (in the same way as the Nordic countries) to develop a common model as a starting point? If so, which countries? Table 9 below provides a global perspective.

Table 9. Adoption of a Case-Mix System Can Fail if not Adjusted to Local Costs and Clinical Practices Self-Developed or with Major Adjustment Compared to Another Case-Mix System

"Buy": Adopted an Existing DRG system	"Build": Develop Country-Based Model
<ul style="list-style-type: none"> • Australia • Denmark • Estonia • France • Germany (based on AR-DRG) • Scandinavia • Mexico Social Security system • Indonesia (Failing) • Ireland • New Zealand • Poland • Slovenia (Failed initially) • Singapore • China Taiwan (Failed) 	<ul style="list-style-type: none"> • Austria • Canada • China (in process) • Hungary • Republic of Korea (in process) • Japan (in process) • Thailand • United Kingdom • United States

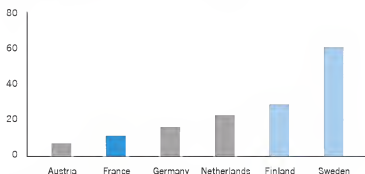
Source: Author's Summary

2. **How good is available coded clinical data on activity?** The quality of coding for patient records will shape the case-based payment system design. All case-based classification systems have two key elements: distinguishing between different groups of diagnoses and procedures, and distinguishing within a single group of diagnoses or procedures in terms of patient complexity. The latter requires good coding of

comorbidities (“coding depth”, the number of additional diagnoses recorded). Without adequate information systems and data, a country cannot proceed to use case-based payments. Thailand, for example, has one of the most sophisticated management information systems in the region, if not the world. However, this volume has documented the challenges of data quality and “code creep” over time.

3. **How well trained are the medical-record and facility coders?** A number of factors will affect the accuracy of coding, including the adequacy of documentation in clinical records, availability of skilled coding staff, and clear and consistent coding rules. Is coding standardized, and are coding professionals performing to some standard, such as accreditation? By definition, under a case-based payment system, coding will affect payment. For this reason, most countries implementing case-based payments introduce coding audits as part of implementation to verify the accuracy of coding. Strategies to create or develop the coding workforce may also be required.
4. **How precise is your cost data?** Cost data are most valuable when captured at a granular level of detail, e.g. the specific activities of each hospital department (typically referred to as patient-level costing). This is not always feasible; hence, some form of estimation or modelling is generally required. However, countries need not review cost data for all facilities. The European experience has demonstrated that a small but representative sample (e.g. 6% facilities in Germany, up to 62% admissions in Sweden as seen below in Figure ____) can be adequate in the beginning to set weights. Is use of charges an option? Since many countries in the Asia and Pacific region have a history of FFS, charges might serve as a first proxy for costs, as outlined in Thailand. However, charge policies may vary across providers and may bias both purchasers in setting weights, and hospital management in responding to incentive structures. Thailand has decided to move from use of charges to measuring costs.

Figure 2: How Many Facilities' Cost Data are Needed?



Note: Light blue = % admissions. Finland surveyed only 5 reference hospitals

Dark blue = Top down costing; Grey = Bottom up costing

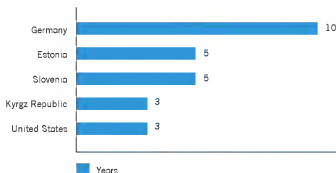
Source: Busse, et al. 2011

5. **How capable and ready is the purchaser (i.e. health ministry or insurance fund), and also the provider?** The success of introducing case-based payments will, in part, be influenced by the implementation process, including stakeholder engagement. Mechanisms and capacity for this process are therefore important. In a similar vein, how autonomous is the provider? Some countries, like Japan and the Republic of Korea, have large private sectors dedicated to the provision of care. For government sectors, hospital governance in the Asia and Pacific region is moving toward greater autonomization (China, Indonesia, the Philippines, Viet Nam) and corporatization (Hong Kong SAR, Singapore). However, these changes need to be consistent with new incentive structures.
6. **Should there be pricing adjustments beyond those incorporated in classification design?** These are generally for legitimate and unavoidable factors that influence the cost of care, such as adjustments for poor patients, for teaching and research, and for input costs (e.g. labour costs) across urban and rural areas. For example, the Australian national arrangements have a number of pricing adjustments in their case-based system related to patient and facility characteristics.

7. **Should volume be capped?** The Asia and Pacific region have good models for volume caps, including individual hospital caps in Australia, regional caps for hospital admissions in Thailand, and global caps in Japan. Globally, many countries have experienced excessive volumes under case-based payments (e.g. Hungary), thus diluting the potential impacts of the payment model. The region's higher income countries can be viewed as models in the design of volume caps. Activity caps automatically limit planned expenditure and, in this way, case-based payment arrangements give the same level of spending certainty provided by global budgets and line-item budgets. Allocation caps also can serve as a valuable planning tool.
8. **Should the case-based model be phased in and how?** Almost every country in the world has chosen to phase in the case-based system, given its significant impact on behaviour, typically over a period from three years (the USA) to 10 years (Germany) as shown in Figure __ below. Case-based payment implementation may be phased in terms of hospital functions, typically starting with inpatient activity, as this is the largest component of hospital expenditure, and also has the most well developed casemix classifications. For hospitals alone, case-based payment can be phased in by a number of approaches: by classification categories (Japan, the Philippines, the Republic of Korea and selected counties in China); by costs, such as blended payments of old and new payment models (Portugal, the USA); by the nature of costs, such as salaries versus other types of costs (Thailand); by participating hospitals (the Republic of Korea); or by proportion of the population covered by the scheme, for example geographic regions (the USA's pilot programme in New Jersey). Each approach has benefits and risks; however, countries should develop clear strategic paths, so that purchasers and providers can prepare, respond and minimize unintended consequences. This region has introduced at least one new phase-in approach: by disease category. Further evidence is needed to assess

whether this approach can be manipulated through coding selectively, effectively cost-shifting out of a fixed price to a FFS reimbursement category.

Figure 3: Phase-In Slowly: Purchasers and Providers Need Time



Source: Author's Own

9. **Is there adequate monitoring and evaluation?** Every case-based payment reform has delivered surprises for purchasers and providers, necessitating a proactive monitoring and evaluation strategy at the start of phase-in. Monitoring adherence requires establishing funding rules and a governance framework (for example, see <http://www.health.vic.gov.au/hospital-performance/>). Hospitals respond to the rigour of performance controls, and the benefits of ABF can be vitiated if expectations of “bail-outs” prevail or inappropriate responses are tolerated. Evaluation can monitor the impacts of case-based payments on the broader health system. Programme evaluation can be a way to inform stakeholders about any undesirable effects of case-based payments, and to facilitate positive changes in hospitals and the health system. Previous evaluations of the impact of case-based payments globally have shown increased inappropriate admissions, readmissions, unbundling and shifting care to post-acute settings.

10. **Can payment and quality be linked? The next frontier?** Case-based activity payments initially paid for activity, implicitly assuming evenness in quality across providers. More recently, with better information, countries have initiated payment with quality indicators and outcomes. France, Germany, the United Kingdom (Busse et al. 2011) and the USA have focused on indicators related to quality, such as readmissions and hospital-acquired infections. The USA has initiated a 2% withhold to hospitals across the board, followed by a reallocation to the top 20% of hospitals, based on a complicated mix of severity-adjusted performance measures. It has also revised the DRG algorithm to exclude certain complications of care from affecting DRG assignment, thus effectively creating a “non-payment for non-performance” policy. A number of countries, including Germany, the Netherlands, the United Kingdom and the USA, have initiated payment pilots and programmes that share savings for bundled payments or “integrated care” based on costs, quality, outcomes and patient satisfaction (Busse & Stahl, 2014). This volume showcases several countries in the Asia and Pacific region that routinely monitor along multiple dimensions and are already linking payment and quality outcomes. Emergent practices in Indonesia and the Philippines can learn from good practices in countries such as Japan and the Republic of Korea. A simpler approach to incorporating quality considerations into case-based payments is to provide an incentive for hospitals to participate in a hospital accreditation programme, or to require participation in such a programme as part of the conditions of funding.

Preconditions for Success

From these 10 issues, a few clear patterns emerge in terms of institutional “preconditions” for success, which need to be met by countries considering moving to this new approach.

Payment design: Is there one best design? Neither the global evidence (presented in Chapter 4) nor the volume allows us to unequivocally determine the best model or design. Countries start from a current system,

with unique sets of policy challenges and policy objectives, but clearly design details vary. Perhaps the more important issue is how models are evaluated, updated and refined over time. The casemix- and activity-based models demand refinement as technology evolves, cost structures change, and clinical practice patterns change over time.

On a related issue, once implemented, is the setting of rates purely a technocratic process? Chapters 2 and 4 discussed the politics of implementation. But politics and negotiation continue beyond implementation. With advances in technology, new drugs and procedures will be introduced. While not all will result in cost increases, this has most often been the case in the recent past. Whether these changes should be reflected in updates to relative values or creation of a new group, or be treated as outliers, could become a hotly debated topic, as in Japan. Countries will differ in the extent and speed at which a new technology is implemented. For example, a new chemotherapy may be available only for a narrow profile of cases. Negotiation (Japan and the Republic of Korea), as well as cooperation across purchasers and providers (Australia), will be an essential part of the update process.

Information systems: In each country, available clinical and cost data were critical, as were good monitoring and evaluation information systems. Likewise, providers will need good internal management systems that allow them to respond to the new incentive environment. This is typically easier for private and non-profit providers than government or public providers.

Quality assurance systems: These new models in Asia and elsewhere provide lessons on the negative impacts and unintended consequences at admission, during admission, and following hospital discharge. There are incentives for efficiency and, perhaps equally importantly, incentives for under-provision of needed services, and for gaming with coding, readmissions, and so on. Purchasers need a strong quality assurance framework.

Provider autonomy: Incentives are developed to change and improve behaviours, as well as organizational structures. However, even the best design will not succeed without the flexibility to respond in terms of inputs

of skills, equipment and changes in organizational structure. Low- and middle-income countries will need to assess the need for civil service and management reforms to achieve policy objectives with these new models.

Developing these “pre-conditions” for success is not costless, in terms of either investment or time. Finance ministries may need to take a longer-term view of investments now, with impacts and savings accruing only in the medium term of five to seven years.

Finally, hospital payment cannot be divorced from other payment mechanisms in other settings of care. To achieve allocative efficiency, the pricing of hospital care needs to take account of the relationship between hospital payment and other incentive structures, such as:

- other revenue sources (e.g. pharmaceutical revenue); and
- physician payments. The relationship between case-based and physician payments is particularly important, given physicians’ ability to influence care and the issues that may potentially arise if physician and hospital incentives are misaligned.

Policy-makers and technicians must also be ready to address unintended consequences, even in well designed systems. To be effective in pursuing health-sector policy objectives, case-based payment has a number of advantages, but also potential disadvantages, as detailed in Chapter 4 and outlined by Table 10 (below). Case-based payments cannot be implemented

Table 10: What the global evidence tells us about case-based financing

Advantages	Potential issues
<ul style="list-style-type: none"> • Clear price signals • Greater activity • Reduction of queues • Improved technical efficiency • Shorter ALOS • Better recording of patient care in medical records • Improved coding for management information systems • Better information for profiling of quality and efficiency • Improved allocative efficiency 	<ul style="list-style-type: none"> • Price may not reflect resource use • Unnecessary admissions • Skimping of necessary services in hospital • Unbundling of services • Premature discharge • Upcoding • Volume increases (induced demand or revenue enhancement) • Readmissions • Administrative capacity to update based on technology, inflation, changes in cost structure and other factors

with categories and weights alone, but must be supplemented by additional regulatory mechanisms, such as activity ceilings, adjustments to average prices, data audits, monitoring of care processes, and measurement of patient satisfaction and health outcomes.

Countries need to be clear about their purpose and objective for introducing DRGs, as well as their place in health-care financing reform. In the Asia and Pacific region, models reflect different policy objectives in different countries.

Policy-makers need to reflect on the importance of country-specific starting points, objectives and the context in which the hospital payment reforms are being implemented – in addition to other related policies being implemented at the same time – as different starting points lead to different results. Experiences in one country do not necessarily predict those in another (Anderson, 2009), as choices are context-specific and dependent on what objectives are most desired, as well as the political and economic situation.

Countries should be ready to address the necessity for building capacity (Appleby et al., 2012) in relation to information, management of providers, and quality assurance systems. They should also be ready to invest in these measures upfront. This means that robust information systems, together with flexible and transparent management and governance structures, are critical. Implementation of case-based payment is never finished. It is associated with a continual process of refinement and adjustment. The evidence regarding the impact of DRG-based payment systems on efficiency and quality can be limited and mixed, suggesting that improved information systems might be utilized on a never-ending basis to improve prices and link to improved quality of care in the future.

The goal of health care is to improve or at least maintain health status, rather than the activity and output itself. To correctly analyse efficiency, purchasers and health policy leaders will need data on outcomes as well as costs. Without data on patient outcomes, we cannot determine whether a funding mechanism, such as a DRG-based payment system, meets the set efficiency objectives.

References

- Anderson G (2009). The effects of payment by results. *British Medical Journal*. 339.
- Appleby J, Harrison T, Hawkins L et al. (2012). *Payment by Results: How Can Payment Systems Help to Deliver Better Care?* The King's Fund.
- Busse R, Geissler A, Quentin W et al. (2011). *Diagnosis-Related Groups in Europe: moving towards transparency, efficiency and quality in hospitals*. McGraw-Hill International.
- Busse R, Stahl J (2014). Integrated care experiences and outcomes in Germany and the Netherlands. *Health Affairs*. 33(9): 1549–1558.

Appendix 1

Glossary of main terms

Case-based hospital payment systems and related concepts, including Diagnosis-Related Groups (DRGs), are a relatively new area of policy and research in the Asia and Pacific region. While a consistent description of terms is still to be achieved internationally, there is benefit in providing definitions of some of the more common terms used in the preparation of this study and the writing of this volume. The concept of case-based hospital payment systems is one part of a broader field of activity-based or casemix financing approaches, and the terms are sometimes used interchangeably.

Activity-based funding (ABF), case-based funding (CBF), case-based payment (CBP) or case-mix funding (CMF) are all terms used to describe a system in which funding for hospital services is allocated to hospitals according to the number and mix of patients the hospital treats; if a hospital treats more patients or more-complex cases it receives more funding. *DRG-based hospital payment systems* fall within this category.

The case-based approach is an output-funding model that distributes a fixed global budget according to the type and number of hospital patients or cases treated, using classifications that bundle patient-care episodes into clinically coherent and resource homogeneous groups. Case-based approaches provide funding to purchase an agreed volume of work at an agreed price, including reward for improved performance in terms of quantity and efficiency. It provides an incentive to treat patients using the least inputs and is designed to provide equity, transparency and accountability in hospital payment.

The approach provides a framework to categorize, classify, count, cost and fund activities in a uniform and consistent manner, and it is used to manage, administer and monitor the funding of hospital care. The case-based approach provides a basis for applying the same price for the same service across the diverse range of care that is provided by public, private

and not-for-profit providers of hospital services. It is most commonly used for inpatient care.

Base payments (or base rates) are used in some case-based payment designs. The base payment is the currency amount which, when multiplied by the payment relativity or *payment weight*, yields the amount to be paid for a particular DRG.

Cost weights (or relative weights) reflect the amount of hospital resources an average patient in that DRG is expected to consume. They are expressed as relativities against some (arbitrary) average DRG. Each episode of care is assigned to a DRG and each DRG has a cost weight, which is a measure of the cost of treatment of the average inpatient in the DRG. This weight reflects the expected resource intensity of the cases that fall into that DRG, relative to all other DRGs. Briefly, an average cost across all DRGs is used as the reference value and given a weight of one; each DRG is then weighted relative to this reference value.

Diagnosis Procedure Combination (DPC) is a *casemix system* used for national health insurance in Japan. It comprises 18 Major Diagnosis Categories (MDCs), 520 diagnostic groups and 2658 casemix groups. The key classification variables in the DPC algorithm are the diagnosis, procedure and comorbidities/complications (based on the International Classification of Diseases). Procedures are coded using the fee schedule of the national health insurance system.

Diagnosis-Related Groups (DRGs) are a way of describing hospital inpatient activity. The DRG is a statistical measure used to classify hospital cases into one of a number of pre-defined groups according to categories of diagnosis and treatment. DRGs classify patients into groups that are both clinically meaningful and homogeneous in terms of resource utilization (or cost). Relevant diagnoses and procedures are coded for each admitted patient episode and the combination of codes for each episode guide its assignment to a DRG through the use of DRG “*grouping*” software. Most DRG classifications use the International Classification of Diseases for diagnoses and country-specific classifications for procedures.

DRG-based hospital payment systems are a form of *activity-based funding* used to classify hospital services and activities according to the services provided. They are used as the basis for the calculation of standard reimbursement rates for hospital health-care providers. A dollar value is assigned to each *diagnosis-related group* (DRG) as the basis of payment for all cases in that group, without regard to the actual cost of care or duration of hospitalization for any individual case.

Grouper. The grouper is a software package that assigns a DRG to the specific inpatient episode according to the patient's principal diagnosis, ICD classification, gender, age, sex, treatment procedure, discharge status and the presence of complications or comorbidities. In some cases there are different modes of operation, including a "batch grouper" that groups data exported from the hospital patient information system, an "interactive grouper" that allows the entry of demographic fields, and the "server mode" that allows staff to retrieve information tailored to hospital requirements.

Major Diagnosis Categories (MDCs) are mutually exclusive categories (approximately 25 in total) into which all possible principal diagnoses fall. They constitute the preliminary partitioning that occurs before a DRG is assigned. The diagnoses in each category correspond to a single-body system or aetiology.

Payment weights are relativities applied to payments in case-based payment systems. Calculation of payment weights involves adjusting *cost weights* for policy purposes. As a result, payment weights may not reflect cost relativities directly.

Author Biographies

Peter Leslie Annear

Peter Leslie Annear is an Associate Professor at the Nossal Institute for Global Health at the University of Melbourne. A.Prof. Annear is a health economist and health financing specialist who has worked in international development in various capacities since the 1970s. He has more than 20 years' experience working in the health sector in Cambodia, Laos and a number of Asian countries as a consultant and advisor for Ministries of Health and development agencies. A.Prof. Annear has worked with AusAID, WHO, the World Bank, UNESCAP, Belgian Technical Cooperation and other development partners to assist Ministries of Health in policy development and planning. He has published widely in academic journals and commissioned reports on health systems and health financing policy and analysis in the Asian region. A.Prof. Annear is currently carrying out various research projects investigating the coverage and effectiveness of Health Equity Funds for the poor in Cambodia.

Stephen Duckett

Stephen Duckett is Director of the Health Program at Grattan Institute in Melbourne. He has held senior health care leadership positions in Australia and Canada, with a reputation for creativity, evidence-based innovation and reform in areas as diverse as hospital funding (introduction of activity-based funding for hospitals) and quality (new systems of measurement and accountability for safety of hospital care). From 1994 to March 1996 he was Secretary (Director General) of the Australian Commonwealth Department of Human Services and Health (now the Commonwealth Department of Health). From 1996 to 2006 he was Professor of Health Policy and Dean of the Faculty of Health Sciences at La Trobe University. Dr Duckett is an economist with a Masters and PhD in Health Administration from the University of New South Wales and a higher doctorate, the DSc, awarded on the basis of his scholarly contributions, from the Faculty of Medicine of the same University. He is a Fellow of the Academy of the Social Sciences in Australia and of the Australian Academy of Health and Medical Sciences.

Soonman Kwon

Soonman Kwon is Professor and Former Dean of the School of Public Health, Seoul National University. After he received his Ph.D. from the Wharton School of the University of Pennsylvania, he was assistant professor of public policy at the University of Southern California in 1993-1996. He has held visiting positions at the Harvard School of Public Health, London School of Economics, and University of Toronto. He was the president of the Korean Association of Schools of Public Health in 2013-2014, is the President of Korean Gerontological Society and is the President-Elect of Korean Health Economic Association. He was the editor of the *Korean Journal of Public Health* in 2007-2009 and currently the editor of the *Korean Journal of Health Economics and Policy*. He has been on the editorial boards of international journals such as *Social Science and Medicine*, *Health Economics Policy and Law*, *BMC Health Services Research*, and *Ageing Research Reviews*. He has been a member of numerous government committees of Korea and occasionally worked as a short-term consultant of WHO, World Bank, GIZ, and ADB on health systems and financing in Algeria, Bhutan, Cambodia, China, Egypt, Ethiopia, Fiji, Ghana, Indonesia, Kenya, Lao PDR, Malaysia, Maldives, Mongolia, Myanmar, Nepal, Pakistan, Philippines, South Africa, Uganda, and Vietnam. He was a member of the Scientific and Technical Advisory Committee (STAC) of the WHO Alliance for Health Policy and Systems Research and is a member of the Independent Assessment Committee (IAC) of the GAVI.

Dale Huntington

Dale Huntington is currently Director, Asia Pacific Observatory on Health Policy and Systems, based in the WHO Western Pacific Regional Office, Philippines. Previously he was a Scientist with the World Health Organization's Department of Reproductive Health and Research, Geneva. His research interests include bringing evidence to inform public policy towards the private health sector, advancing health equity, aid effectiveness issues, health financing systems, large scale-programme evaluation. He holds a Doctorate in Science degree from the Johns Hopkins University School of Hygiene and Public Health, specializing in health services research and evaluation. Prior to joining the World Health Organization he was a Senior Health Specialist at the World Bank, Washington, D.C. He

has lived and worked in developing countries for over 20 years, including assignments as regional director for USAID supported operations research programmes in West Africa, the Middle East and South and East Asia regions.

John Langenbrunner

John ("Jack") Langenbrunner is a Health Economist with both research and operations experience. Most recently he has served as an Advisor for Social Health Insurance in Indonesia since 2013. Previous to this, he was a Lead Health Economist for the World Bank where he coordinated a Health Financing and Health Insurance Thematic Group within the Bank, and led the Bank's Global Expert Team for Health Financing and Health Systems. Since 2008 he has worked on health financing issues and health insurance design and development issues mostly in mainland China, but also Mongolia, Philippines, Cambodia, Myanmar, Thailand and other East Asian and Pacific countries. Jack's previous book is "Financing Health Care in East Asia and the Pacific: Best Practices and Remaining Challenges," co-authored with Aparnaa Somanathan. He also has co-authored 2 books on Resource Allocation and Strategic Purchasing by insurers and other public and private organizations, and has authored or co-authored a number of related papers. Previous to his work at the World Bank, Jack was with the US Health Care Financing Administration, a public health insurance program for over 80 million Americans. He later went in the early 1990s to the US Office of Management and Budget for 3 years where he (among other things) served on the Clinton Health Care Reform Task Force for the US White House. Jack holds graduate degrees in Economics and Public Policy, as well as Public Health, from the University of Michigan, Ann Arbor, USA.

Luca Lorenzoni

Luca Lorenzoni is an economist at the Health Division at the Organisation for Economic Co-operation and Development (OECD) in Paris. The areas dealt with in the Division comprise health accounts, hospital and health goods and services prices and purchasing power parities, and health and long-term care expenditure forecasting methods. He is also responsible for the liaison with the OECD/Korea Policy Centre in the social policy,

pension and health work. Luca Lorenzoni's personal research areas include the measurement of costs, activity and efficiency at hospital level, DRG development and applications, the estimation of quasi-prices for non-market health and hospitals services, and the link between provider payment systems and quality of care where he has published articles in international journals, including *The Lancet* and *Health Policy*. He is also the co-author of the OECD Health working papers on *Guidelines for improving the comparability and availability of private health expenditure under the system of health accounts framework* (2010), *Description of Alternative Approaches to Measure and Place a Value on Hospital Products in Seven OECD Countries* (2011), *A comparative analysis of health forecasting methods* (2012) and *Comparing Hospital and Health Prices and Volumes Internationally: Results of a Eurostat/OECD Project* (2014). He was part of the International Health Accounts Team that prepared the publication *A System of Health Accounts*, 2011 edition.

Yuki Murakami

Yuki Murakami is currently a Health Economist/Policy Analyst in the Health Division at the Organisation for Economic Cooperation and Development (OECD) in Paris, France. She conducts comparative policy research on the performance of health and long-term care systems. Her recent focus has been on global health financing issues using the System of Health Accounts framework. She carries out projects analysing health expenditure trends and financing mechanisms in both OECD and non-OECD countries. She is also responsible for ageing issues in OECD and non-OECD countries and analyses long-term care reforms and expenditure forecasting models. For her work on global health, Ms Murakami was presented with a "Symbols of Tomorrow" award in 2013 by the All Japan Hospital Association of Japan. The award recognises professionals and researchers in the area of medical care, health and life sciences.

Before joining the OECD in 2011, Ms Murakami worked at the World Bank in Washington DC as a human development economist in the education and health sector for the Latin America and the Caribbean Region. She holds two Masters degrees in health economics from Harvard School of Public Health and the University of Texas.

Changwoo Shon

Changwoo Shon is Associate Research Fellow of the Seoul Institute. He received his M.P.H. and Ph.D. in Health Policy and Management from Seoul National University. He has published papers on provider payment systems, impacts of DRG-based payment system, health policy governance, and community-based health promotion program. He is interested in both qualitative and quantitative analysis to evaluate health policy.

Ke Xu

Ke Xu is the Coordinator for the Health Policy and Financing Unit, Division of Health Sector Development in WPRO. Her work covers a broad range of health financing, governance and health policy development. She has been actively engaging with policy makers in countries in the Western Pacific Region to develop and implement health policies for universal health coverage. She contributed to the World Health Report 2000 on health systems performance assessment and the World Health Report 2010 on health systems financing and universal coverage while working in WHO headquarters. She is an advocate of evidence-based policy formulation. She has worked with many countries using scientific evidence in support of policy making process and published extensively on financial risk protection, poverty impact of health payment and equity in health financing. Among other tasks she is actively engaged in monitoring and evaluation of universal coverage.

The Asia Pacific Observatory on Health Systems and Policies (the APO) is a collaborative partnership of interested governments, international agencies, foundations, and researchers that promotes evidence-informed health system policy regionally and in all countries in the Asia Pacific region. The APO collaboratively identifies priority health system issues across the Asia Pacific region; develops and synthesizes relevant research to support and inform countries' evidence-based policy development; and builds country and regional health systems research and evidence-informed policy capacity.



ISBN-13

978 92 9061 732 7



THE WORLD BANK



World Health Organization